United States Department of Agriculture

Soil Conservation Service

In cooperation with North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and the Brunswick County Board of Commissioners

Soil Survey of Brunswick County, North Carolina

Disclaimer

The tabular data set is not designed for use as a primary regulatory tool in permitting or siting decisions, but it may be used as a reference source. This is public information and may be interpreted by organizations, agencies, units of government, or other groups or individuals based on their needs. The user, however, is responsible for the appropriate application of the data. Federal, State, or local regulatory bodies are not to reassign to the Natural Resources Conservation Service any authority for the decisions that they make. NRCS will not perform any evaluations of these data for purposed related solely to State or local regulatory programs.

The interpretations and analyses derived from these data do not eliminate the need for onsite sampling, testing, and detailed study of specific sites for intensive uses. Thus, these data and their interpretations are intended for planning purposes only. Files are dated and users are responsible for obtaining the latest version of the data.

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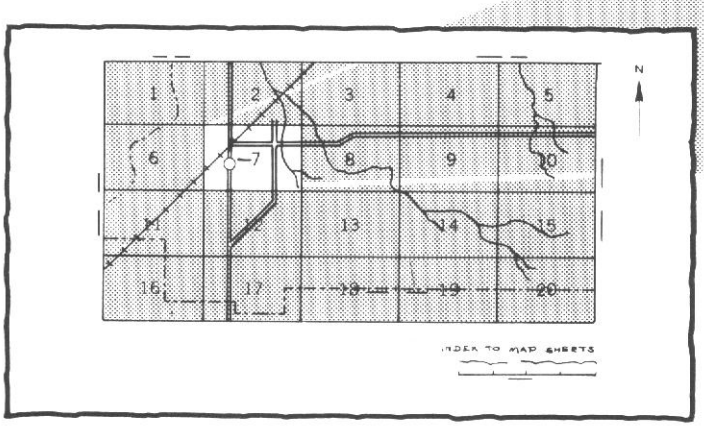
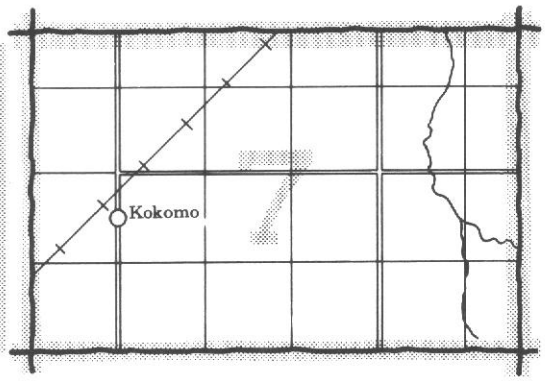
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets."





2. Note the number of the map sheet and turn to that sheet.

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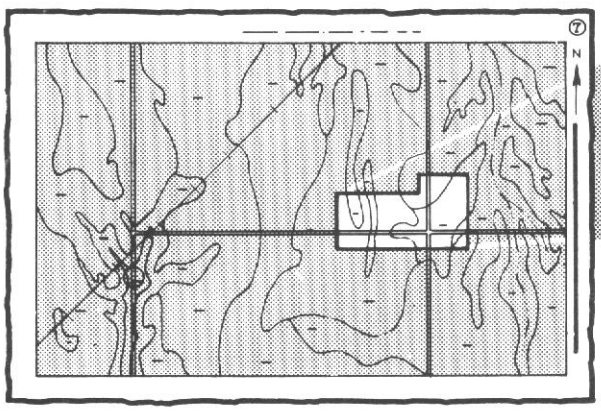
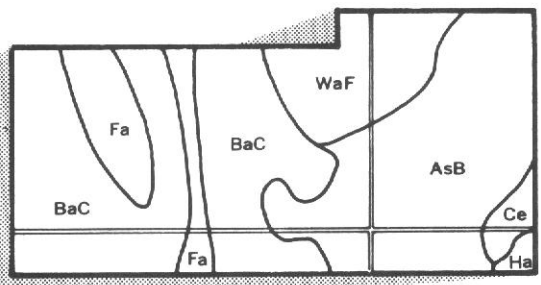
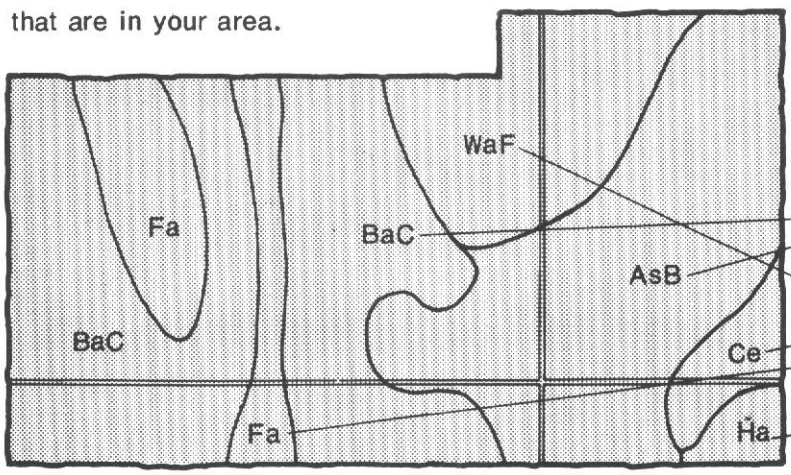




4. List the map unit symbols that are in your area.

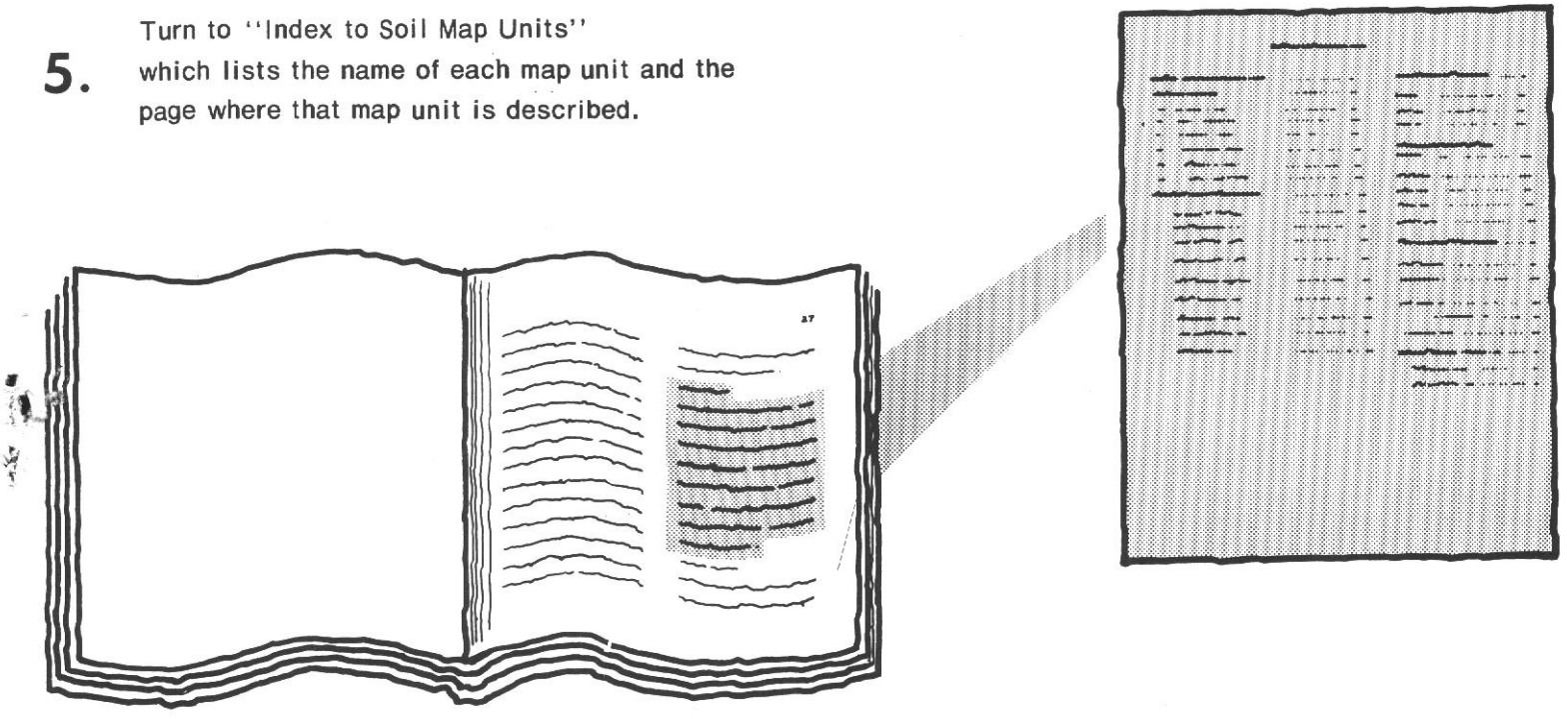


Symbols

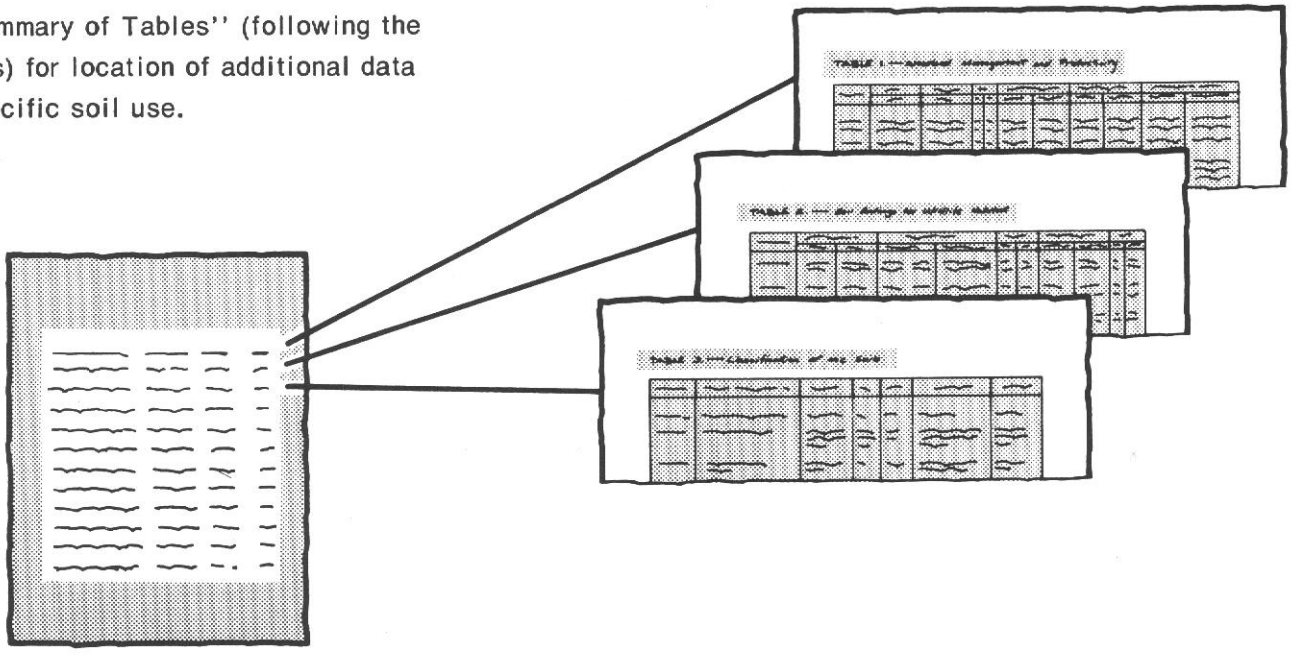
AsB
BaC
Ce
Fa
Ha
WaF

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the North Carolina Agricultural Research Service, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, martial status, or age.

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1982. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Soil Conservation Service and the North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and Brunswick County Board of Commissioners. It is part of the technical assistance furnished to the Brunswick County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The first soil survey of Brunswick County was published in 1937. This survey updates the first soil survey and provides additional information.

Cover: Sea-oats and American beachgrass growing on a foredune of Newhan fine sand, 2 to 30 percent slopes.

Contents

Soil Series

Issued November 1986

Index to Map Units

Summary of Tables

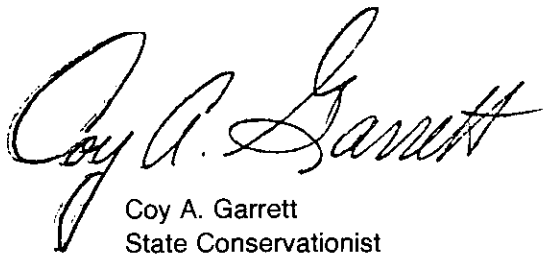
Foreword

This soil survey contains information that can be used in land-planning programs in Brunswick County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

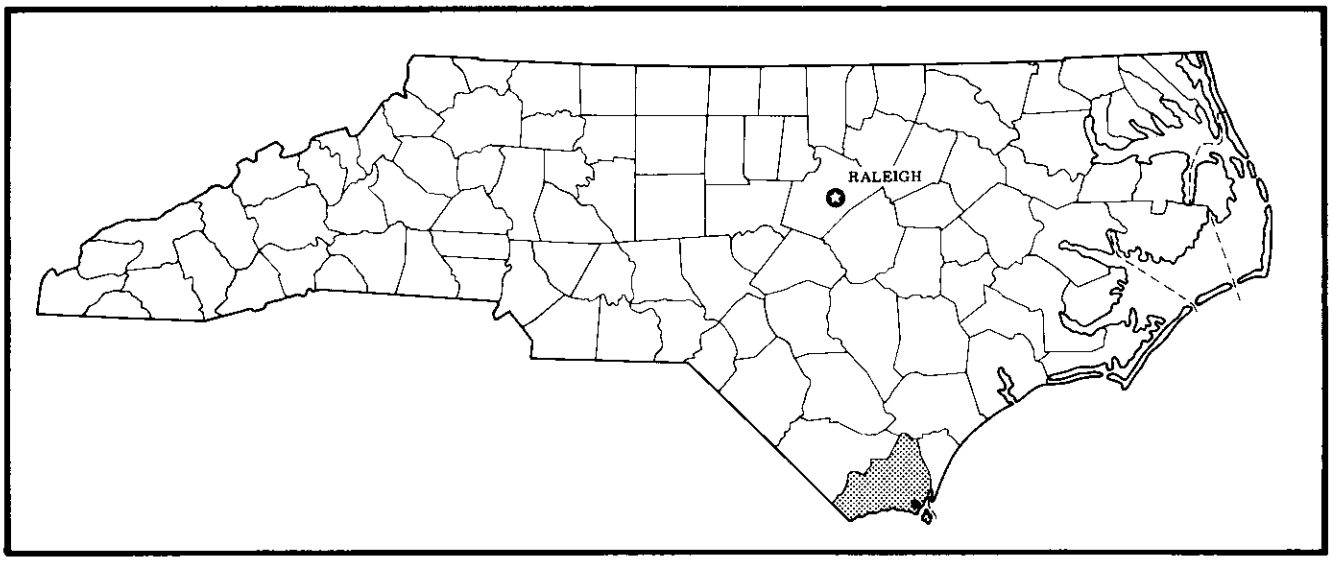
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the North Carolina Agricultural Extension Service.



Coy A. Garrett
State Conservationist
Soil Conservation Service



Location of Brunswick County in North Carolina

Soil Survey of Brunswick County North Carolina

By William L. Barnhill, Soil Conservation Service

Fieldwork by William L. Barnhill, Steve Evans, David Knight, Jon Vrana, Hugh Hassell, Glenn Simpson, and Willie E. Spruill, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with
North Carolina Department of
Natural Resources and Community Development,
North Carolina Agricultural Research Service,
North Carolina Agricultural Extension Service,
and Brunswick County Board of Commissioners

General Nature of the Survey Area

Brunswick County was established in 1764. The original area included all of present Brunswick County, a major portion of Columbus County, and small areas of New Hanover County. It was later reduced to its present boundaries, which include 550,713 acres *(6)*.

In the early days, rice was the most important crop in the county. Lumber and pine derivatives, such as turpentine and resin, were also an important part of the economy.

Brunswick County is approximately 80 percent woodland. One-half of the woodland is in small woodlot ownership. The rest is in large tracts owned by paper companies. Ten percent of the county is cropland. The main crops are corn, tobacco, and soybeans. The remaining 10 percent is beaches, marsh, and small urban and industrial areas.

Industry includes a large nuclear power plant and chemical plants producing synthetic fibers, fertilizer, and citric acid. Wood for paper mills is an important product. Fishing is also a vital part of the economy of Brunswick County. It includes shellfish, such as shrimp, oysters, and clams; food fish, such as mullet, flounder, spot, and sea bass; and industrial fish, such as menhaden and thread herring.

Tourism is an important factor in the economy of Brunswick County. Large areas on Bald Head Island, Oak Island, Holden Beach, Ocean Isle Beach, and Sunset Beach are used for summer or year-round residences.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Brunswick County is hot and humid in summer, but the coast is frequently cooled by sea breezes. Winter is cool with occasional, brief cold spells. Rain falls throughout the year and is fairly heavy. Annual precipitation is adequate for all crops. Every few years a hurricane crosses the area.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Southport, North Carolina, for the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 47 degrees F, and the average daily minimum temperature is 37 degrees. The lowest temperature on record, which occurred at Southport on January 18, 1977, is 9 degrees. In summer the average temperature is 78 degrees, and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred on June 26, 1952, is 103 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 32 inches, or 60 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 25 inches. The heaviest 1-day rainfall during the period of record was 9.24 inches at Southport on September 29, 1957. Thunderstorms occur on about 45 days each year, and most occur in summer.

Snowfall is rare. The average seasonal snowfall is less than 1 inch. However, snow in excess of 1 inch that lasts more than a day does occasionally occur. The greatest snow depth at any time during the period of record was 9 inches.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 65 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 11 miles per hour, late in winter and early in spring.

Physiography, Relief, and Drainage

Brunswick County is in the lower Coastal Plain and ranges in elevation from 75 feet to sea level. All of the soils in the county formed in Coastal Plain sediment or in sediment deposited by streams flowing through the county. Most of the county is nearly level with short slopes along the main drainageways. The main streams are wide and shallow, and those near the ocean are affected by tides. A short distance inland, the streams become narrow with broad interstream areas *(5)*.

The county has three geomorphic surfaces—the Wicomico, Talbot, and Pamlico surfaces. The Wicomico surface covers about one-third of the county. It ranges from 75 to 45 feet above sea level. The Talbot surface covers more than one-half of the county. It ranges from 45 to 25 feet in elevation. The Pamlico surface covers a narrow strip of mainland near the ocean and Cape Fear River and also covers the flood plain of Waccamaw River. It ranges from 25 feet to sea level.

The Green Swamp is a roughly circular area of about 175,000 acres in the north-central part of the county. The east side is drained by the Cape Fear River, the west side by the Waccamaw River, and the south side drains to the Atlantic Ocean. It has the widest undissected interstream area in the county and the largest area of muck soils. This very poorly drained interstream area has an accumulated organic surface layer of variable thickness. The accumulations are thickest where they have filled in the Carolina bays and in drainageways. The accumulated organic matter blankets the landscape and has obliterated the landscape features outlining Carolina bays and the upper part of many drainageways.

The Cape Fear River is on the east side of the county. Within this drainage area are numerous irregularly-shaped ponds and lakes created by the dissolution and removal of underlying limestone. These lakes and ponds are particularly common near Boiling Spring Lakes. Much of the southeastern part of this area is undulating sand, and the rest is smooth or has convex slopes near drainageways.

The Waccamaw River drainage area is on the west and northwest sides of the county. It is dissected by shallow tributary streams and has broad interstream areas of poorly drained to moderately well drained soils. Coastal creeks drain the south side of the county. Numerous Carolina bays and low parallel sand ridges are in this area. A few of the bays have a thick organic surface layer.

Water Supply

Ground water from the surficial deposits is of good quality but may have a high iron content. The surficial deposits are a valuable aquifer and furnish water for many rural residences. Generally, this aquifer is 10 to 30 feet thick and 40 feet thick in some places south of U.S. Highway 17.

Below the surficial deposits is a limestone aquifer. It consists of phosphatic limestone with layers of sand, silt, and sandy marl. The limestone aquifer is an important source of water. It is underlain by sedimentary deposits that contain brackish water *(3, 10)*.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of sedimentary material. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate,

and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. During mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another resulting in gradual changes in characteristics. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. Although they can observe only a limited number of soil profiles, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied (fig. 1). They noted soil color, texture, size and shape of soil aggregates, kind of sedimentary material, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and

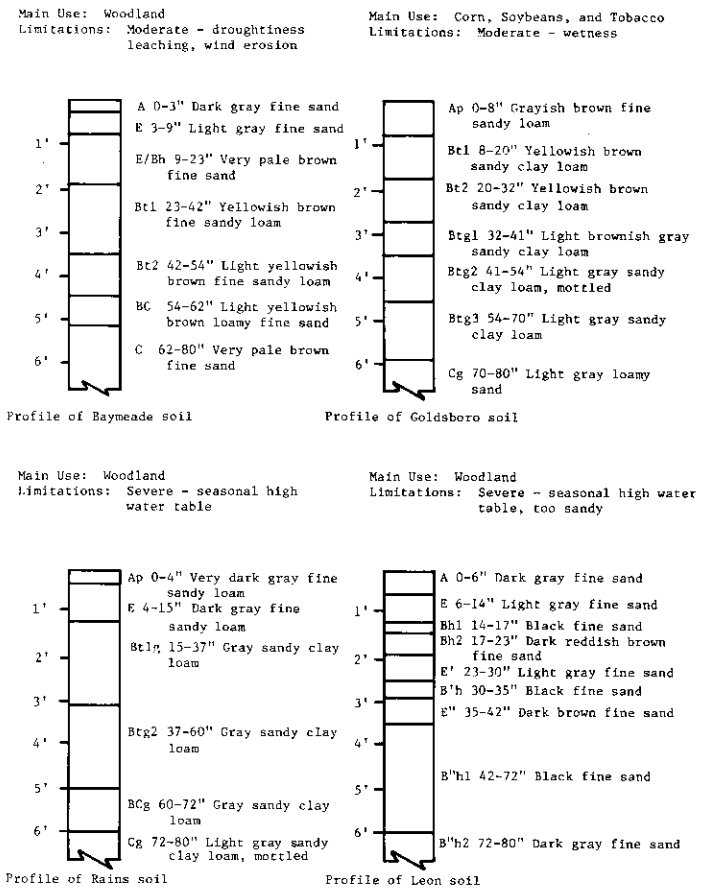


Figure 1.—Soil profile, major use, and limitations of four contrasting soils.

biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is

identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one map unit can occur in other map units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Leon-Murville-Mandarin

Nearly level, very poorly drained to somewhat poorly drained soils that have a weakly cemented, sandy subsoil; on uplands

The largest areas of these soils are in the southern part of the county. Typically, the mapped areas are irregular in shape.

This map unit makes up about 19 percent of the county. It is about 38 percent Leon soils, 34 percent Murville soils, 14 percent Mandarin soils, and 14 percent soils of minor extent.

The poorly drained Leon soils are on broad, smooth, interstream areas generally between the Mandarin and Murville soils (fig. 2). Typically, they are fine sand throughout and have a weakly cemented subsoil near the surface.

The very poorly drained Murville soils are in the middle of broad interstream areas and in slight depressions. They have a mucky fine sand surface layer and a weakly cemented fine sand subsoil.

The somewhat poorly drained Mandarin soils are adjacent to drainageways near broad interstream areas. They are fine sand throughout and are weakly cemented in the upper part of the subsoil.

The soils of minor extent in this map unit are Kureb soils on sand ridges, Tomahawk soils intermingled with these soils, and Wando and Pactolus soils in nearly level and gently sloping areas near the coast.

Nearly all of the acreage in this map unit is in woodland. The main limitation for Leon and Murville soils is long periods of wetness. The main limitations for Mandarin soils are the hazard of drought and leaching of plant nutrients.

A few areas have been drained and cleared for specialized crops and gardens. Except for blueberries, very few farm crops are grown. The seasonal high water table and leaching of plant nutrients are the main limitations.

The soils generally are too wet for residential or recreational development. Artificial drainage only partly corrects the wetness problem. Caving of cutbanks and high seepage rates are continuing limitations of these soils.

2. Goldsboro-Lynchburg-Rains

Nearly level, moderately well drained to poorly drained soils that have a loamy subsoil; on uplands

These soils are on broad, smooth, interstream areas and slightly convex divides in the western and central parts of the county (fig. 3). The mapped areas are irregular in shape.

This map unit makes up about 18 percent of the county. It is about 30 percent Goldsboro soils, 22 percent Lynchburg soils, 20 percent Rains soils, and 28 percent soils of minor extent.

The moderately well drained Goldsboro soils are on slightly convex divides and near drainageways. These soils have a fine sandy loam surface layer and a sandy clay loam subsoil.

The somewhat poorly drained Lynchburg soils and the poorly drained Rains soils are in broad, smooth, interstream areas and in depressions on slightly convex divides. Lynchburg soils have a fine sandy loam surface layer and a sandy loam and sandy clay loam subsoil. Rains soils have a fine sandy loam surface layer and a sandy clay loam subsoil.

The soils of minor extent are Norfolk, Foreston, Woodington, Baymeade, Onslow, Bragg, Grifton, and Pantego soils. Norfolk and Baymeade soils are near side slopes in gently sloping areas. Foreston and Onslow soils are intermingled throughout this map unit. Grifton and Pantego soils are in small, shallow depressions and in narrow drainageways. Bragg soils are in industrial areas.

Most of the acreage of this map unit is in woodland. The rest of this map unit has been cleared for cropland. A seasonal high water table is the main limitation.

These soils generally are too wet for residential or recreational development unless they are drained.

3. Torhunta-Croatan-Pantego

Nearly level, very poorly drained soils that have a loamy subsoil; on uplands

These soils are mainly in the large interstream areas in the north-central part of the county (fig. 4). Typically, the mapped areas are broad and oblong.

This map unit makes up about 15 percent of the county. It is about 46 percent Torhunta soils, 33 percent Croatan soils, 14 percent Pantego soils, and 7 percent soils of minor extent.

Most of the acreage of this map unit is near the center of broad interstream areas that are nearly level. Some of these soils are in filled, oval depressions in the otherwise slightly better drained areas near streams. The accumulated organic matter in interstream areas has hidden the landscape features outlining many Carolina bays and the upper reaches of many drainageways.

Torhunta soils have a mucky fine sandy loam surface layer and a fine sandy loam subsoil.

Croatan soils have a thick, well decomposed, organic matter surface layer. The underlying soil material is mucky sandy loam, sandy loam, and sandy clay loam.

Pantego soils have a mucky loam surface layer and a sandy clay loam subsoil.

The soils of minor extent are Woodington and Rains soils on the edge of shallow drainageways and Murville soils intermingled throughout the map unit.

Nearly all of the acreage in this map unit is in woodland. The main limitation is wetness from a seasonal high water table.

A few areas of these soils have been drained and cleared for cropland. A seasonal high water table 6 to 8 months a year is the main limitation.

These soils generally are too wet for residential or recreational development. Artificial drainage only partly corrects the wetness limitation.

4. Woodington-Foreston

Nearly level, poorly drained and moderately well drained soils that have a loamy subsoil; on uplands

These soils are in shallow depressions on broad, smooth, intersteam areas and on slightly convex divides in the northern half of the county. The mapped areas are irregularly shaped.

This map unit makes up about 13 percent of the county. It is about 46 percent Woodington soils, 35 percent Foreston soils, and 19 percent soils of minor extent.

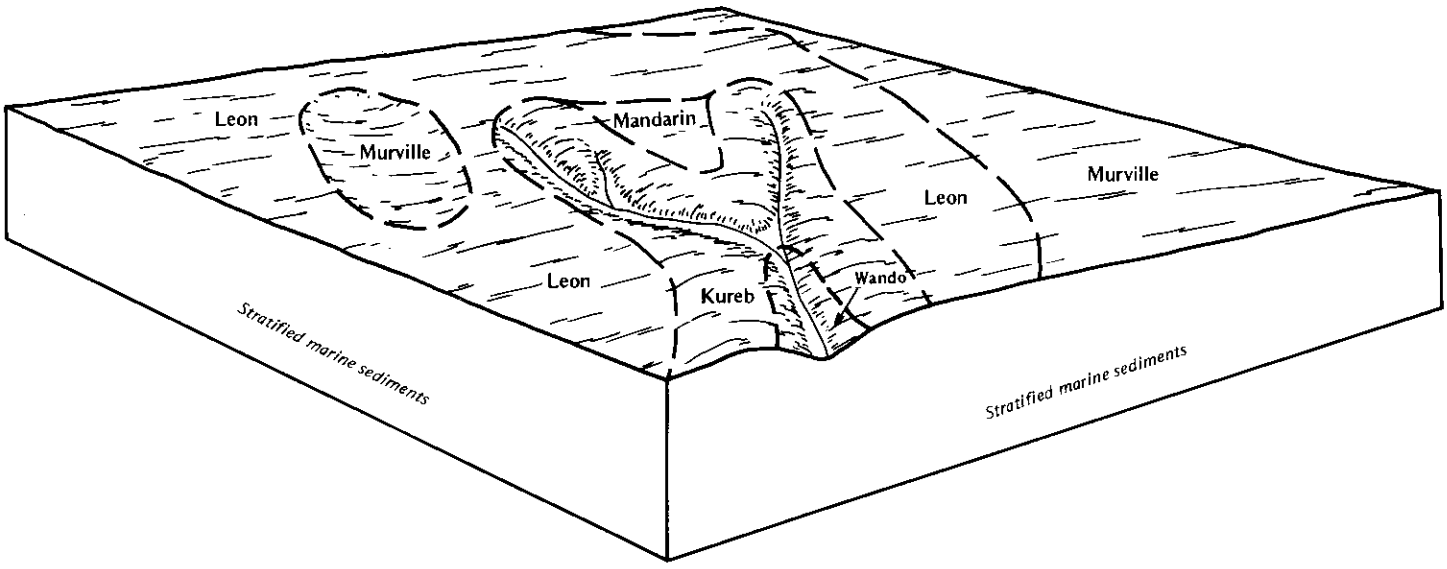


Figure 2.—Typical landscape pattern of Leon-Murville-Mandarin and Kureb-Wando general soil map units in southern Brunswick County.

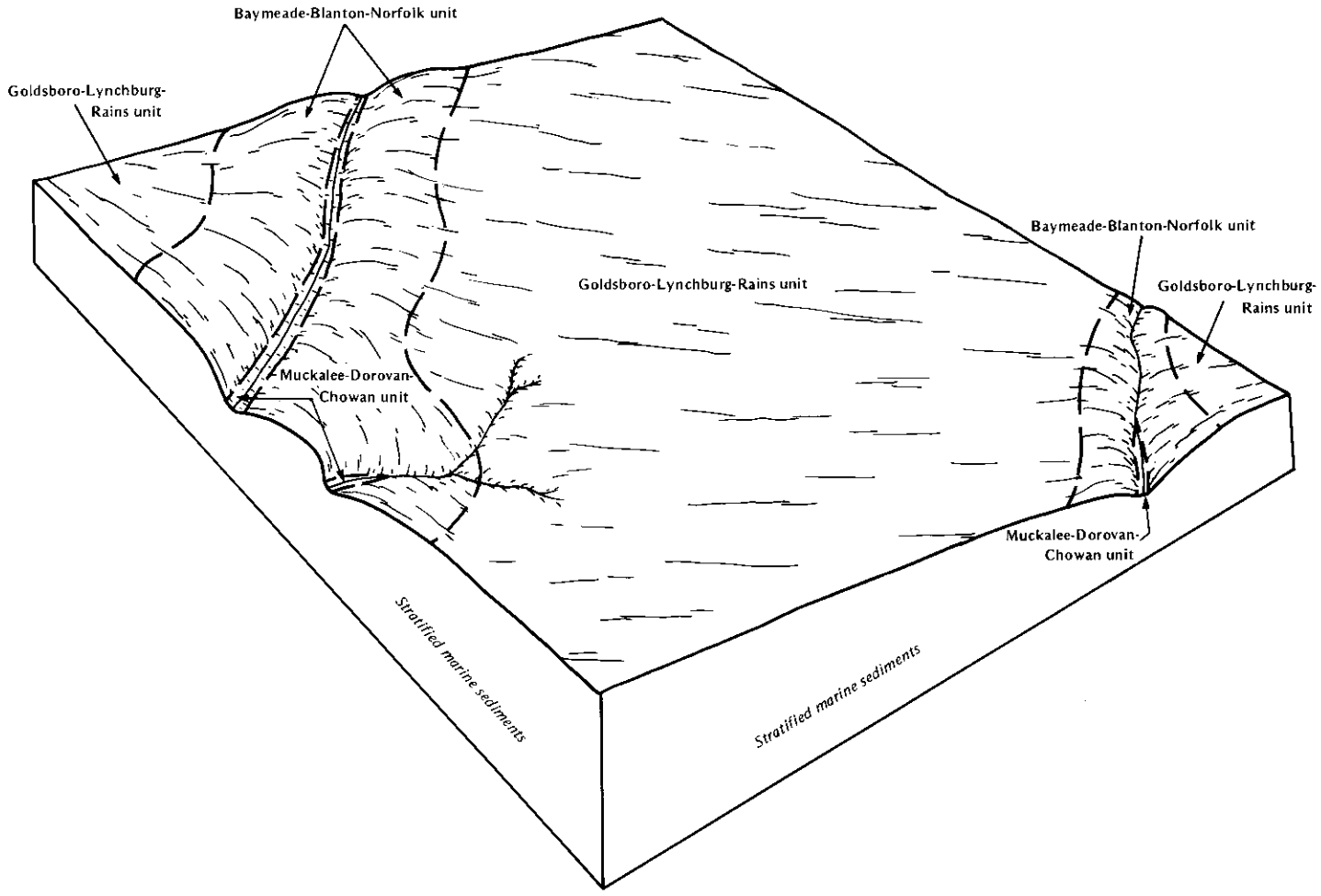


Figure 3.—Typical landscape pattern of Goldsboro-Lynchburg-Rains, Baymeade-Blanton-Norfolk, and Muckalee-Dorovan-Chowan general soil map units in Brunswick County.

The poorly drained Woodington soils are on broad, smooth, interstream areas and in shallow depressions on slightly convex divides (see figure 4). These soils have a fine sandy loam surface layer and a fine sandy loam or sandy loam subsoil.

The moderately well drained Foreston soils are on broad, slightly convex divides. These soils have a loamy fine sand surface layer and a fine sandy loam subsoil.

The soils of minor extent are Rains, Leon, and Torhunta soils intermingled throughout this map unit and Baymeade soils near drainageways.

Most of the acreage in this map unit is in woodland. The main limitation is wetness from a seasonal high water table.

Many areas have been cleared for cropland. Wetness from a seasonal high water table is the main limitation.

These soils generally are too wet for residential development unless they are drained. Wetness is the main limitation for recreational development on Woodington soils. Foreston soils are well suited to recreational development.

5. Baymeade-Blanton-Norfolk

Nearly level to gently sloping, well drained and moderately well drained soils that have a loamy subsoil; on uplands

These soils are generally near major streams throughout the county (see figure 3). Typically, the mapped areas are long and narrow.

This map unit makes up about 12 percent of the county. It is about 70 percent Baymeade soils, 13

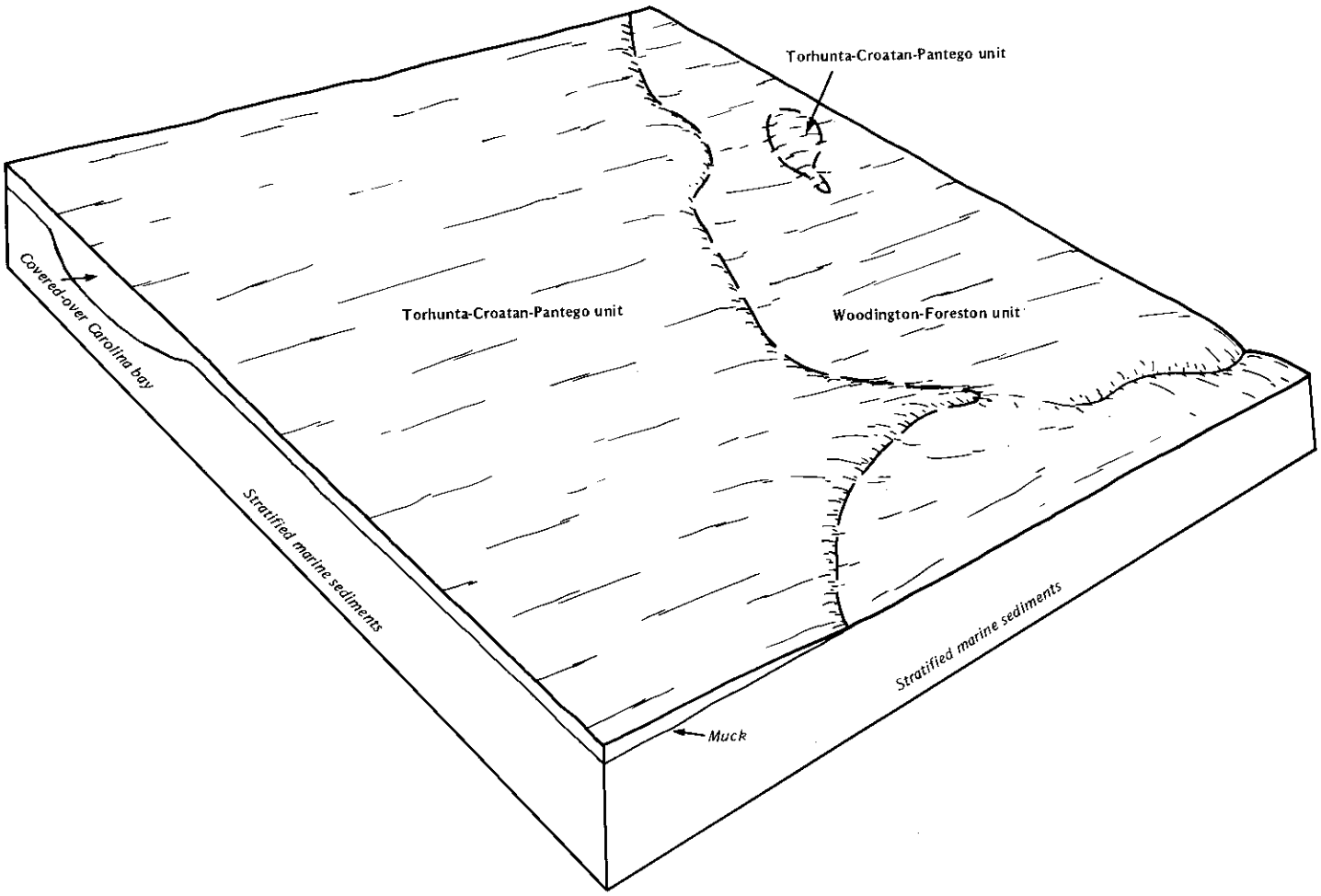


Figure 4.—Typical landscape pattern of Torhunta-Croatan-Pantego and Woodington-Foreston map units in northern Brunswick County.

percent Blanton soils, 7 percent Norfolk soils, and 10 percent soils of minor extent.

The nearly level to gently sloping, well drained Baymeade soils are on low ridges and convex divides. These soils have a fine sand surface layer and a fine sandy loam subsoil.

The nearly level to gently sloping, moderately well drained Blanton soils are on slightly convex divides near drainageways. These soils have a fine sand surface layer and a sandy loam subsoil.

The gently sloping, well drained Norfolk soils are in convex areas. These soils have a loamy fine sand surface layer and a sandy clay loam subsoil.

The soils of minor extent in this map unit are Marvyn, Onslow, Goldsboro, Foreston, and Leon soils. Marvyn soils are on short side slopes along drainageways. Onslow, Goldsboro, and Foreston soils are on the nearly level parts of the landscape. Leon soils are in depressions.

Many areas of these soils have been cleared for cropland. The main limitations for cropland on Baymeade and Blanton soils are leaching of plant nutrients and the hazards of drought and soil blowing in large fields. Norfolk soil is well suited to cropland.

These soils are used for residential and recreational development. High seepage rates, caving of cutbanks, and poor trafficability are the main limitations for Baymeade and Blanton soils. The Norfolk soils are well suited to recreational development.

6. Muckalee-Dorovan-Chowan

Nearly level, poorly drained and very poorly drained soils that have sandy, loamy, or mucky underlying material; on flood plains

These soils are along major freshwater streams throughout the county, particularly the Waccamaw and Cape Fear Rivers (see figure 3). The mapped areas are long and narrow.

This map unit makes up about 10 percent of the county. It is about 49 percent Muckalee soils, 22 percent Dorovan soils, 9 percent Chowan soils, and 20 percent soils of minor extent.

The poorly drained Muckalee soils are on narrow flood plains of streams. The surface layer is loam, and the underlying layers are sandy loam and loamy sand.

The very poorly drained Dorovan soils are on low flood plains near streambanks. These soils consist of well decomposed organic matter.

The poorly drained Chowan soils are on flood plains of the Cape Fear River. These soils are silt loam, silty clay loam, and mucky silt loam over muck.

The soils of minor extent are Johns, Lumbee, Grifton, and Pactolus soils. These soils are in narrow, irregularly-shaped, slightly elevated areas on the flood plains, and in long, narrow areas along the sides of the flood plains and stream channels.

Most of the acreage of this map unit is forested. The hazard of frequent flooding and a high water table are the main limitations.

These soils generally are not used for farming or for urban or recreational development because of flooding and wetness. They are used as habitat for wetland wildlife and provide an excellent environment for wetland plants.

7. Kureb-Wando

Nearly level to sloping, excessively drained soils that are sandy throughout; on uplands

These soils are mainly in the southern part of the county. Typically, mapped areas are long and narrow.

This map unit makes up about 8 percent of the county. It is about 37 percent Kureb soils, 18 percent Wando soils, and 45 percent soils of minor extent.

The nearly level to sloping, excessively drained Kureb soils are in undulating areas. They are fine sand throughout and have soft dark concretions in bands and streaks below 1 foot.

The nearly level to gently sloping, excessively drained Wando soils are in interstream areas. They are fine sand throughout and have soft dark concretions in bands and streaks below 1 foot.

The soils of minor extent in this map unit are Leon, Mandarin, Pactolus, Baymeade, and Blanton soils. Leon and Mandarin soils are in depressions. Baymeade, Pactolus, and Blanton soils generally are near drainageways.

Most of the acreage in this map unit is in woodland. The main limitations are the hazard of drought, leaching of plant nutrients, caving of cutbanks, and difficulty using equipment on loose, sandy soils.

A few areas of these soils have been cleared for coastal bermudagrass pasture and hay. Leaching of plant nutrients, and the hazards of drought and soil blowing are the main limitations.

Areas of these soils generally are not used for residential or recreational development. The main limitations are high seepage rates, caving of cutbanks, poor traction, and the hazard of drought.

8. Bohicket-Newhan-Lafitte

Nearly level, very poorly drained soils that have a clayey subsoil or are mucky throughout, and gently sloping to steep, excessively drained soils that are sandy throughout; on tidal flats, coastal ridges, and barrier dunes

These soils are influenced by oceanic conditions. Typically, the mapped areas are long and narrow.

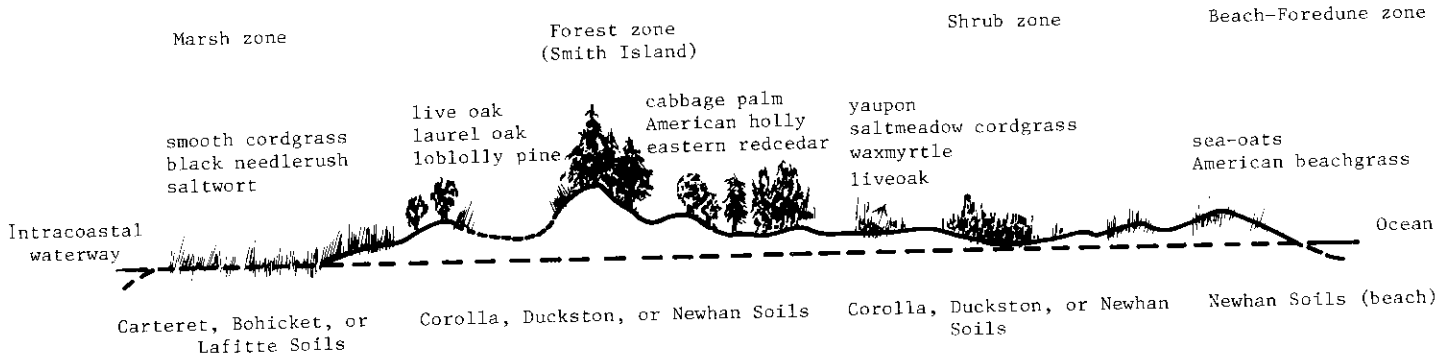


Figure 5.—Characteristic soils and dominant vegetation of the Outer Banks section of Brunswick County, North Carolina.

This map unit makes up about 5 percent of the county. It is about 48 percent Bohicket soils, 16 percent Newhan soils, 5 percent Lafitte soils, and 31 percent soils of minor extent.

The nearly level, very poorly drained Bohicket soils are on tidal flats. They have a silty clay loam surface layer and a silty clay subsoil. They are flooded each day by high tides.

The gently sloping to steep, excessively drained Newhan soils are on coastal ridges and barrier dunes. They are fine sand throughout.

The nearly level, very poorly drained Lafitte soils are on tidal flats. They are organic throughout. They are flooded each day by high tides.

The soils of minor extent are Carteret soils in narrow areas adjacent to waterways; Corolla soils in depressions adjoining Newhan soils; Duckston soils on the nearly level areas between tidal marsh and dunes; and Newhan and Yaupon soils, which are dredge spoil, generally along coastal waterways.

Most of the acreage of this map unit is in marsh grasses. The sandy ridges have scattered beach grasses, waxmyrtle, and yaupon holly (fig. 5). The soils of minor extent support areas of scrub vegetation and maritime forest.

Bohicket and Lafitte soils are important as habitat for wetland wildlife and provide an excellent environment for wetland plants. Wetness and tidal flooding are the main limitations for cropland or woodland.

Newhan soils are used for recreation and coastal residential developments. Slope, sandiness, high seepage rate, caving of cutbanks, and the hazard of drought are the main limitations.

Detailed Soil Map Units

The map unit symbols on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Wando fine sand, 0 to 6 percent slopes, is one phase in the Wando series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Wando-Urban land complex, 0 to 6 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Baymeade and Marvyn soils, 6 to 12 percent slopes, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the suitabilities, limitations, and capabilities for many uses. The Glossary defines many of the terms used in describing the soils.

BaB—Baymeade fine sand, 1 to 6 percent slopes. This well drained soil is on low ridges and convex divides. Most of the acreage of this map unit is used for woodland. The rest is used for cropland or urban areas. Individual areas of these soils generally are broad and long and range from 35 to 250 acres.

Typically, the surface layer is dark gray fine sand 3 inches thick. The subsurface layer, 20 inches thick, is light gray fine sand in the upper part and very pale brown fine sand in the lower part. The subsoil is 39 inches thick. It is yellowish brown fine sandy loam in the upper part, light yellowish brown fine sandy loam in the middle part, and light yellowish brown loamy fine sand in the lower part. The underlying material to a depth of 80 inches is very pale brown fine sand.

Surface runoff is slow. Permeability is moderately rapid, and the available water capacity is low. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 4 to 5 feet below the surface.

Included with this soil in mapping are small areas of Blanton, Kureb, Foreston, Onslow, and Leon soils. Kureb soils are on small, slightly higher ridges. Blanton soils are near drainageways. Foreston, Onslow, and Leon

soils are slightly lower on the landscape than Baymeade soil. The included soils make up about 20 percent of this map unit.

Baymeade soil is mostly in woodland. The native vegetation is adapted to well drained, sandy soils. The major canopy trees are longleaf pine, loblolly pine, red oak, white oak, and hickory. The understory includes turkey oak, blackjack oak, sassafras, persimmon, dogwood, huckleberry, pineland threeawn, panicum grasses, American beautyberry, and lichens. Some large areas of this soil have been cleared, bedded, and planted to loblolly pine. Seedling mortality and difficulty using equipment on the dry, sandy surface are the main limitations. The areas of this soil are poor to fair habitat for deer, rabbit, fox, quail, and other wildlife.

Many areas of this soil are used for crops. Leaching of plant nutrients and the hazards of drought and wind erosion are the main limitations in the use and management of this soil for crops. The addition of plant nutrients and the use of minimum tillage, cover crops, crop residue management, and windbreaks help control wind erosion and reduce leaching.

This soil is suited to some urban uses. Seepage and caving of cutbanks are the main limitations. Lawns and shrubs are difficult to establish and maintain because of droughtiness and leaching of plant nutrients. Irrigating, fertilizing frequently, and adding organic matter increase growth of lawns and shrubs on this sandy soil. This soil is poorly suited to recreational uses. The sandy nature of the soil is the main limitation.

This soil is in capability subclass IIIs and woodland group 3s.

BDC—Baymeade and Marvyn soils, 6 to 12 percent slopes. This map unit consists of well drained Baymeade and Marvyn soils on short side slopes. Baymeade and Marvyn soils do not occur in a regular pattern. Some mapped areas are dominantly Baymeade soil; other mapped areas are dominantly Marvyn soil. In some mapped areas the two soils are nearly equal in extent. These soils are combined in the same map unit because of similarities in use and management. Individual areas of this map unit are long and narrow and range from 5 to 100 acres.

The Baymeade soil makes up 50 percent of the map unit. Typically, it has a surface layer of dark gray fine sand 3 inches thick. The subsurface layer, 20 inches thick, is light gray fine sand in the upper part and very pale brown fine sand in the lower part. The subsoil is 39 inches thick. It is yellowish brown fine sandy loam in the upper part, light yellowish brown fine sandy loam in the middle part, and light yellowish brown loamy fine sand in the lower part. The underlying material to a depth of 80 inches is very pale brown fine sand.

In Baymeade soil, surface runoff is slow. Permeability is moderately rapid, and the available water capacity is low. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 4 to 5 feet below the surface.

The Marvyn soil makes up 40 percent of the map unit. Typically, it has a surface layer of grayish brown loamy fine sand 5 inches thick. The subsurface layer is yellowish brown loamy fine sand 6 inches thick. The subsoil is 34 inches thick. The upper part of the subsoil is yellowish brown fine sandy loam, the middle part is yellowish brown sandy clay loam, and the lower part is brownish yellow sandy clay. The underlying material to a depth of 80 inches is gray sandy clay loam in the upper part and mottled light gray, yellow, and strong brown sandy loam in the lower part.

In Marvyn soil, surface runoff is medium. Permeability is moderate, and the available water capacity is moderate. This soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed.

Included with these soils in mapping are areas that have short slopes greater than 12 percent and small areas that are eroded. There are small areas where Blanton soils and a soil that has a clayey subsoil are intermingled with this map unit. Generally, the surface layer is thicker on the lower half of the slope. Small areas of Muckalee soils are in narrow, wet drainageways. The included soils make up 10 percent of this map unit.

Baymeade and Marvyn soils have many small areas in native woodland. The major canopy trees are loblolly pine, longleaf pine, red oak, white oak, and hickory. The understory includes holly, dogwood, persimmon, blueberry, black cherry, and greenbrier. Openland and woodland areas of these soils are good habitat for deer, rabbit, squirrel, fox, quail, and other wildlife.

A small acreage is used for pasture, and a few areas of this soil are in cropland. Generally, these areas are too narrow and sloping to cultivate easily.

These soils are suited to some urban uses. Slope is a limiting factor for septic tank absorption fields and for commercial buildings. Seepage and caving of cutbanks are limitations for other urban uses. These soils are poorly suited to most recreational uses. Slope and sandiness are the main limitations.

Baymeade soil is in capability subclass IIIs and woodland group 3s. Marvyn soil is in capability subclass IIIe and woodland group 2o.

BnB—Blanton fine sand, 0 to 5 percent slopes. This moderately well drained soil is in slightly convex interstream areas. Most of the acreage of this map unit is in woodland; the rest is idle land or is used for residential sites. Individual areas of this soil generally are long and irregular in width and range from 15 to 175 acres.

Typically, the surface layer is gray fine sand 5 inches thick. The subsurface layer is fine sand 43 inches thick. It is light gray in the upper part, yellowish brown in the

middle part, and light yellowish brown in the lower part. The subsoil to a depth of 80 inches is yellowish brown sandy loam.

Surface runoff is slow. Permeability is rapid in the thick sandy surface and subsurface layers and moderate in the loamy subsoil. The available water capacity is low. This soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. A perched water table can be above the subsoil for a short time during wet periods.

Included with this soil in mapping are small intermingled areas of Baymeade soils and a soil without a hardpan. Wando and Kureb soils are intermingled in areas of this map unit near the coast. In addition, this map unit includes small areas that have slopes greater than 5 percent and small areas of poorly drained Muckalee soils in narrow drainageways. The included soils make up about 25 percent of this map unit.

Blanton soil has large areas in woodland. The main canopy trees are longleaf pine, loblolly pine, red oak, white oak, and hickory. The understory includes dogwood, sassafras, holly, turkey oak, blackjack oak, pineland threeawn, panicum grasses, huckleberry, American beautyberry, and lichens. A few areas of this soil have been cleared, bedded, and planted to loblolly pine. Seedling mortality and difficulty using equipment on the dry, sandy surface are the main limitations. These areas are poor to fair habitat for deer, rabbit, fox, quail, and other wildlife.

A few areas of this soil are used for crops. The chief crops are corn, soybeans, and tobacco. Leaching of plant nutrients and the hazards of drought and wind erosion are the main limitations. Addition of plant nutrients and the use of minimum tillage, cover crops, crop residue management, and windbreaks help control wind erosion and reduce leaching.

This soil is suited to most urban uses. Seepage, caving of cutbanks, and the sandy nature of the soil are the main limitations. Lawns and shrubs are difficult to establish and maintain because of droughtiness and leaching of plant nutrients. Irrigating, fertilizing frequently, and adding organic matter increase growth of lawns and shrubs. This soil is poorly suited to recreational uses.

This soil is in capability subclass IIIs and woodland group 3s.

BO—Bohicket silty clay loam. This nearly level, very poorly drained soil is on tidal flats at elevations of 0 to 3 feet above sea level. It is dissected by narrow areas of water. The mapped areas are generally inaccessible, and observations were not as detailed as those of other map units. Individual areas of this soil are broad and range from 25 to 350 acres.

Typically, the surface layer is dark gray silty clay loam 15 inches thick. The underlying material to a depth of 70 inches is dark gray silty clay.

Surface runoff is very slow. Permeability is very slow. The soil ranges from neutral to moderately alkaline throughout. The water table fluctuates with the rise and fall of the daily tides. The soil is flooded each day by tidal water.

Included with this soil in mapping are long, narrow areas of Carteret soils that are adjacent to waterways. Also, small areas of Lafitte soils are intermingled with these soils. The included soils make up about 20 percent of this map unit.

Bohicket soil has native vegetation adapted to tidal marsh. The vegetation consist of smooth cordgrass and black needlerush (fig. 6). The edges of these tidal marsh areas are important as habitat for raccoons, white-tailed deer, river otter, and marsh rabbit. Birds using these areas are clapper rail, sora rail, gallinule, cattle egret, American egret, blue heron, black duck, lesser scaup, hooded merganser, and eastern brown pelican. During high tides these areas are used by crab, shrimp, and many kinds of fish, such as flounder, minnows, mullet, and menhaden. Reptiles, such as American alligators and young sea turtles, also use this area.

This soil is generally not used for forestry, cropland, or residential sites. Daily tidal flooding, wetness, and excess salt are the main limitations. Recreational uses are hunting and fishing.

This soil is in capability subclass VIIIw. It is not assigned to a woodland group.

BrB—Bragg fine sandy loam, 2 to 6 percent slopes. This is a well drained soil on constructed landscape segments. These cut-and-filled areas are graded or smoothed for landscaping large industrial sites. Individual areas of this soil range from 10 to 125 acres.

Typically, the surface layer is dark gray fine sandy loam 10 inches thick. The underlying material to a depth of 75 inches is dark grayish brown sandy clay loam in the upper part, grayish brown fine sandy loam and dark gray sandy clay loam in the middle part, and very pale brown loamy fine sand in the lower part.

Surface runoff is medium. Permeability is moderately slow, and the available water capacity is moderate. This soil is very strongly acid or strongly acid in the surface layer, unless it has been limed. The underlying material ranges from very strongly acid to neutral. For short periods, a perched water table is common between layers of the filled soil.

Included with this soil in mapping are small areas of Goldsboro, Baymeade, Wando, and Norfolk soils. These soils are in small areas where the excavation cutting was shallow or none. The included soils make up about 15 percent of this map unit.

This soil is well suited to most urban uses. However, an occasional perched water table occurs during wet periods. Erosion is a hazard on unvegetated areas. This

Figure 6.—Black needlerush on Bohicket silty clay loam near Lockwood Folly River.

soil is suited to most recreational uses. Moderately slow permeability is the main limitation.

This soil is in capability subclass IIIe and woodland group 4s.

CA—Carteret loamy fine sand. This nearly level, very poorly drained soil is on tidal flats at elevations of 1 to 3 feet above sea level. It is dissected by a narrow area of water. The mapped areas are generally inaccessible, and observations were not as detailed as those of other map units. Individual areas of this soil are long and narrow and range from 10 to 200 acres.

Typically, the surface layer is dark greenish gray loamy fine sand 9 inches thick. The underlying material to a depth of 72 inches is greenish gray fine sand in the upper part and dark greenish gray fine sand in the lower part.

Surface runoff is very slow. Permeability is rapid. The soil is mildly alkaline or moderately alkaline throughout. The water table fluctuates with the rise and fall of the daily tides. The soil is flooded each day by tidal water.

Included with this soil in mapping are long, narrow areas of Bohicket soils and small areas of Lafitte soils. These included soils make up about 20 percent of this map unit.

Carteret soil has native vegetation adapted to tidal marsh. The important vegetation consists of smooth cordgrass and small areas of black needlerush. On higher areas, the vegetation includes black neddlerush and small inclusions of salt meadow cordgrass, bulrush, sea oxeye, marshelder, saltgrass, eastern baccharis, and three-square. The edges of these tidal areas are important habitat for raccoons, white-tailed deer, river otter, and marsh rabbit. Birds using these areas are clapper rail, sora rail, gallinule, cattle egret, American egret, blue heron, black duck, lesser scaup, hooded merganser, and eastern brown pelican. During high tides these areas are used by crab, shrimp, and many kinds of

fish, such as flounder, mullet, minnows, and menhaden. Reptiles, such as American alligators and young sea turtles, also use this area.

This soil is generally not used for forestry, cropland, or residential sites. Tidal flooding, surface ponding, and excess salt are the main limitations. Recreational uses are hunting and fishing.

This soil is in capability subclass VIIIw. It is not assigned to a woodland group.

CH—Chowan silt loam. This nearly level, poorly drained soil is on flood plains of the Cape Fear River and its tributaries. Inland, the vegetation is hardwoods, but it changes to cattails, black needlerush, and giant cordgrass near the coast. Observations of the soil in this map unit were not as detailed as those for other map units that were more accessible. The few individual areas of this soil are long and irregular in width and range from 40 to 1,000 acres.

Typically, the surface layer is dark grayish brown silt loam 4 inches thick. The underlying material to a depth of 80 inches is grayish brown silty clay loam in the upper part, black mucky silt loam in the middle part, and very dark grayish brown and dark brown muck in the lower part.

Surface runoff is very slow. Permeability is moderately slow in the mineral horizon. The soil ranges from extremely acid to medium acid in the mineral horizon and is extremely acid or very strongly acid in the underlying organic horizon. This soil is flooded for six months of most years.

Included with this soil in mapping are narrow areas of a soil that has silty sediment deposited over sand, sandy loam, or sandy clay loam. This soil is generally intermingled along the river banks in this map unit. A similar soil that has a thinner, silty, fluvial sediment deposited over organic material is in narrow areas adjacent to the toe slope of the uplands. These included soils make up about 30 percent of this map unit.

Inland, Chowan soil is in native woodland. The vegetation is adapted to long periods of flooding. The main canopy trees are water tupelo (fig. 7), baldcypress, red maple, yellow-poplar, and sweetgum. The understory includes redbay, sweetbay, honeysuckle, poison-ivy, bracken, greenbrier, and sphagnum moss. Near the coast, the vegetation is cattails, giant cordgrass, and scattered black needlerush. These wetland areas are important as habitat for deer, raccoons, rabbit, bobcat, opossum, squirrel, and otter; many birds; and reptiles, such as American alligators and turtles.

This soil generally is not used for cropland, or for residential or recreational development. The hazard of flooding, wetness, and excess humus are the main limitations. The main recreational use is hunting.

This soil is in capability subclass VIIw and woodland group 2w.

Figure 7.—Water tupelo on Chowan silt loam on the Cape Fear River flood plain.

Co—Corolla fine sand. This nearly level, somewhat poorly drained to moderately well drained soil is on the inland side of the Outer Banks in low areas adjacent to undulating sand ridges. Most of the acreage of this map unit is in native vegetation. Individual areas of this soil are long and irregular in width and range from 10 to 150 acres.

Typically, the surface layer is grayish brown fine sand 1 inch thick. The underlying material to a depth of 80 inches is very pale brown fine sand in the upper part, light brownish gray fine sand in the middle part, and light olive gray fine sand in the lower part.

Surface runoff is slow. Permeability is very rapid, and the soil has a high seepage rate. The available water capacity is low. The soil ranges from medium acid to

mildly alkaline throughout. The seasonal high water table is 1.5 to 3 feet below the surface. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Duckston and Newhan soils. The Duckston soils are in lower areas on the landscape, and the Newhan soils are on small ridges. These included soils make up about 25 percent of this map unit.

Corolla soil is mostly in native vegetation adapted to alternate wet and dry periods. The important vegetation consists of live oak, evening primrose, marshhay cordgrass, wild olive, bitter panicum, waxmyrtle, and yaupon.

This soil is important habitat for white-tailed deer, raccoons, loggerhead turtle, cottontail rabbit, eastern brown pelican, least tern, and bobwhite quail.

This soil is generally not used for farming or woodland. It is poorly suited to urban and recreational uses because of sandiness, caving of cutbanks, wetness, and flooding.

This soil is in capability subclass VIIw. It is not assigned to a woodland group.

CT—Croatan muck. This nearly level, very poorly drained soil is in flat interstream areas between widely spaced natural drains. Nearly all of the acreage of this map unit is in woodland. This soil is in oval-shaped depressions and in irregularly shaped, broad, flat areas. The largest areas are in the north-central part of the county. Some of the mapped areas were difficult to transect, and observations were not as detailed as those for other map units. Individual areas range from 100 to 1,000 acres.

Typically, the surface layer is well decomposed muck to a depth of 39 inches. It has about 30 percent mineral content and 70 percent organic matter content, which includes woody material (fig. 8). Below the muck, to a depth of 45 inches, is dark brown mucky sandy loam. The underlying material to a depth of 80 inches is mottled brown and dark grayish brown sandy loam in the upper part and dark gray sandy clay loam in the lower part.

Surface runoff is very slow to ponded. The soil has slow to moderately rapid permeability and high volume change when it dries. The organic material is extremely acid except in areas where the surface layer has been limed. The underlying mineral horizons range from extremely acid to slightly acid. The seasonal high water table is at or near the surface for 8 to 10 months of the year. This soil is subject to rare flooding for brief periods.

Included with this soil in mapping are small areas of Torhunta, Murville, and Pantego soils. These soils are intermingled throughout this map unit. Also included in this map unit is approximately 1,500 acres of a soil that has a muck layer 51 to 65 inches thick. It is generally near the center of the mapped area. Included soils make up about 25 percent of this map unit.

Figure 8.—A profile of Croatan muck, showing the high wood content, in the Green Swamp.

Croatan soil is mostly in woodland. The vegetation is adapted to wetness. The main canopy trees are loblolly pine, pond pine, baldcypress, Atlantic white-cedar, and water tupelo. Large areas of this soil have been ditched, bedded, and planted to loblolly pine plantations. The understory includes loblolly-bay, titi, gallberry, red maple, huckleberry, greenbrier, cane (giant cane), blueberry, redbay, sweetbay, swamp cyrilla, and sphagnum moss. This soil is important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, black bear, birds, and other wildlife.

A few areas of this soil have been artificially drained and are used for cropland. Corn and soybeans are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can reduce wetness. The drainage system commonly includes open ditches and grading or "crowning" fields for surface drainage. Excessive drainage, however, can cause subsidence and increase the hazard of fire in the organic material.

This soil generally is not used for residential or recreational development because of flooding, wetness, and excess humus. Low strength is a limitation for roads and streets.

This soil is in capability subclass VIIw undrained and in capability subclass IVw drained. It is in woodland group 4w.

DO—Dorovan muck. This nearly level, very poorly drained soil is on low flood plains of freshwater streams. Nearly all of the acreage of this map unit is in woodland. The mapped areas of this soil are generally inaccessible, and observations were not as detailed as those for other map units. Individual areas of this soil are long and irregular in width and range from 20 to 400 acres.

Typically, to a depth of 99 inches the soil is black, well decomposed organic matter with a live root mat in the surface few inches of muck.

Surface runoff is very slow. The soil has moderate permeability and high volume change when it dries. The soil is extremely acid in the organic material. The water table is at or near the surface during dry periods. This map unit is ponded or frequently flooded during wet periods.

Included with this soil in mapping are long, narrow areas of Muckalee soils near stream banks. Muckalee soil makes up about 10 percent of this map unit.

Dorovan soil is typically in woodland. The vegetation is adapted to wetness. The main canopy trees are baldcypress, red maple, sweetgum, water tupelo, black willow, sweetbay, and Atlantic white-cedar. Important understory species are gallberry, greenbrier, titi, and sphagnum moss. These areas are important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, mink, otter, black bear, birds, and other wildlife.

This soil is generally not used for residential or recreational development because of wetness and flooding. Low strength is a limitation for roads and streets.

This soil is in capability subclass VIIw and woodland group 4w.

Du—Duckston fine sand. This nearly level, poorly drained soil joins the marshes of the coastal area. Individual areas of this soil are long and irregular in width and range from 5 to 100 acres.

Typically, the surface layer is light brownish gray fine sand 4 inches thick. The subsurface layer is dark gray fine sand 4 inches thick. The underlying material to a depth of 80 inches is light brownish gray fine sand in the upper part and dark gray fine sand in the lower part.

Surface runoff is very slow. Permeability is very rapid above the water table. The soil ranges from neutral to moderately alkaline throughout. The water table 1 to 2 feet below the surface and fluctuates with the tide. This soil is subject to occasional flooding.

Included with this soil in mapping are small areas of Corolla and Carteret soils. The Corolla soils are in the slightly higher areas, and the Carteret soils are in the marshes. The included soils make up about 25 percent of this map unit.

Most areas are in a native plant community consisting of waxmyrtle, black willow, blueberry, marshhay cordgrass, dotted smartweed, Virginia buttonweed, pennywort, and saltwort. These areas are habitat for white-tailed deer, raccoons, cottontail rabbit, loggerhead turtle, cattle egret, American egret, great blue heron, and crabs.

This soil is generally not used for recreational development or urban areas because of wetness, sandiness, and flooding.

This soil is in capability subclass VIIw. It is not assigned to a woodland group.

Fo—Foreston loamy fine sand. This nearly level, moderately well drained soil is on slightly convex interstream areas. Most of the acreage of this map unit is in woodland; the rest is in cropland. Individual areas of this soil are irregular in shape and are 25 to 150 acres. In the Green Swamp, a few areas are about 500 acres.

Typically, the surface layer is dark gray loamy fine sand 4 inches thick. The subsurface layer is yellowish brown loamy fine sand 8 inches thick. The subsoil, 66 inches thick, is yellowish brown fine sandy loam in the upper part and light gray fine sandy loam in the lower part. The underlying material to a depth of 85 inches is light gray loamy sand.

Surface runoff is slow. Permeability is moderately rapid, and the available water capacity is moderate. Ditchbanks and trench walls cave, and the soil has a high seepage rate. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 2.5 and 3.5 feet below the surface.

Included with this soil in mapping are small areas of Woodington soils in shallow depressions and small areas of Baymeade soils near drainageways. Also, small areas of Goldsboro, Onslow, and Tomahawk soils are intermingled throughout this map unit. The included soils make up about 20 percent of this map unit.

Foreston soil has large areas in woodland. The main canopy trees are loblolly pine (fig. 9), sweetgum, blackgum, southern red oak, white oak, yellow-poplar, sycamore, southern redcedar, red maple, hickory, willow oak, and water oak. Large areas of this soil have been bedded and planted to loblolly pine. The understory includes American holly, gallberry, dwarf azalea, sourwood, dogwood, huckleberry, persimmon, black cherry, waxmyrtle, blueberry, and greenbrier. These areas are important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, and other wildlife.

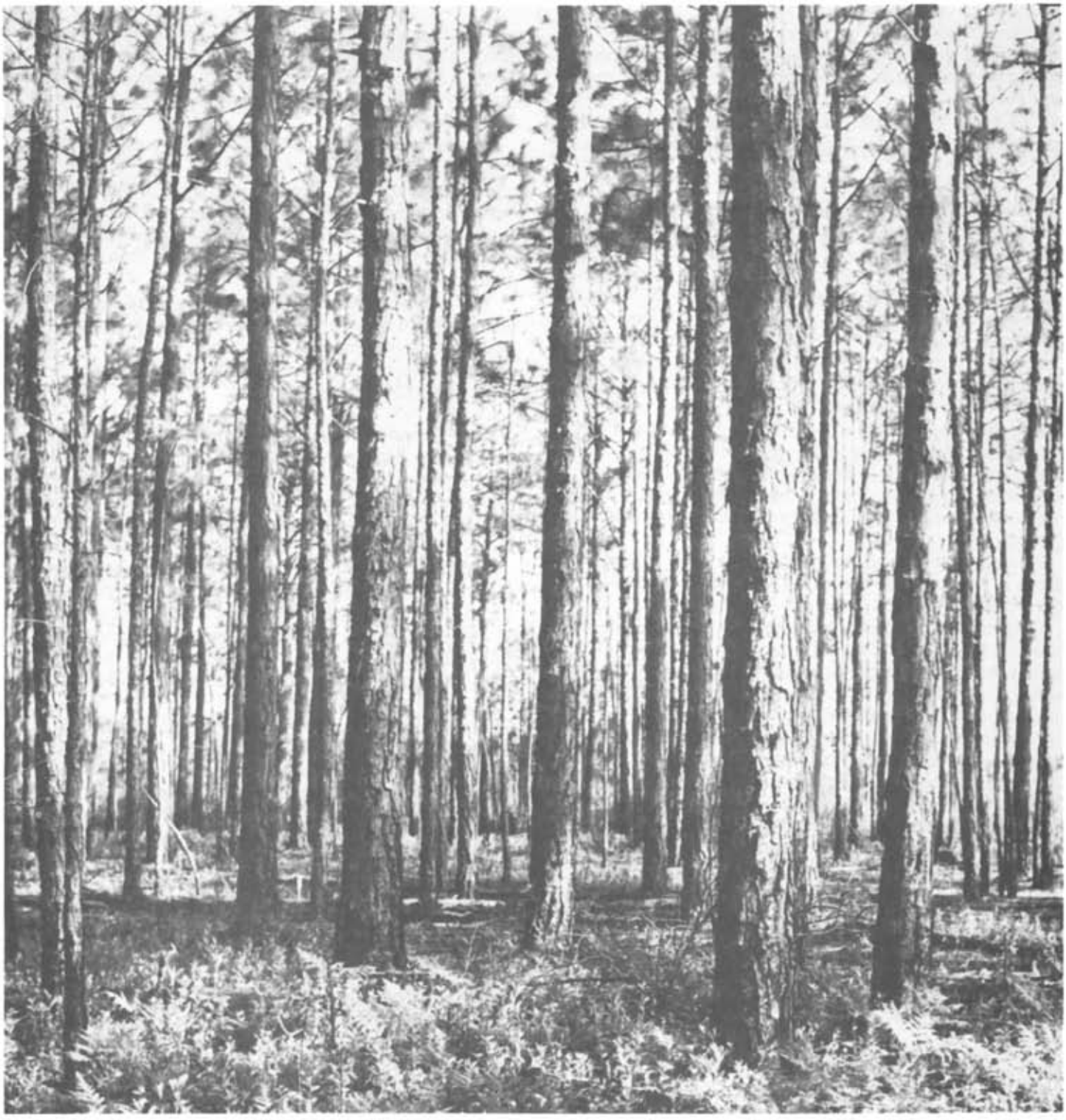


Figure 9.—Loblolly pine plantation on Foreston loamy fine sand in the Green Swamp.

Some areas of this soil are used for cropland. Corn, soybeans, tobacco, and small grains are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can help control wetness and improve aeration in the lower part of the root zone. Drainage systems commonly include open ditches, tile, and land grading to eliminate depressions that pond.

This soil is suited to most urban uses; however, it is poorly suited to sanitary facilities. Wetness and seepage are the main limitations. This soil is well suited to recreational uses.

This soil is in capability subclass IIw and woodland group 2w.

GoA—Goldsboro fine sandy loam, 0 to 2 percent slopes. This moderately well drained soil is near drainageways on interstream divides. About one-half of the acreage is in woodland; the rest is in cropland. This soil is throughout most of the county. Individual areas of this soil are long and irregular in width and range from 20 to 250 acres.

Typically, the surface layer is grayish brown fine sandy loam 8 inches thick. The subsoil is sandy clay loam 62 inches thick. It is yellowish brown in the upper part, light brownish gray, mottled light gray, brownish yellow, and red in the middle part; and light gray in the lower part. The underlying material to a depth of 80 inches is light gray loamy sand.

Surface runoff is slow. Permeability is moderate, and the available water capacity is moderate. This soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 2 to 3 feet below the surface.

Included with this soil in mapping are areas of Goldsboro soils that have a sandy loam surface layer. Also included are small areas of Foreston, Onslow, Norfolk, and Lynchburg soils. Foreston and Onslow soils are intermingled throughout this map unit. Norfolk soils are near side slopes on gently sloping areas, and Lynchburg soils are near interstream areas and in slight depressions. The included soils make up about 15 percent of this map unit.

Goldsboro soil has large areas in woodland. The main canopy trees are loblolly pine, sweetgum, blackgum, southern red oak, white oak, yellow-poplar, sycamore, southern redcedar, red maple, hickory, willow oak, and water oak. Large areas of this soil have been bedded and planted to loblolly pine. The understory includes American holly, gallberry, dwarf azalea, sourwood, dogwood, huckleberry, persimmon, black cherry, waxmyrtle, blueberry, and greenbrier. These areas are important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, and other wildlife.

Many areas of this soil are used for cropland. Corn, soybeans, tobacco, and small grains are the main crops (fig 10). Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system helps control wetness and improves aeration in the lower part of the root zone. Drainage systems commonly include open ditches, tile, and land grading to eliminate depressions that pond.

This soil is suited to urban and recreational development. Wetness is the main limitation. Some areas need artificial drainage or land grading to improve surface drainage.

This soil is in capability subclass IIw and woodland group 2w.

Gt—Grifton fine sandy loam. This nearly level, poorly drained soil is in slight depressions in broad interstream areas. Most of the acreage of this map unit is in woodland; a small acreage is in cropland. Most of this soil is in the western part of the county. Individual areas are long and irregular in width and range from 25 to 150 acres.

Typically, the surface layer is dark grayish brown fine sandy loam 6 inches thick. The subsurface layer is grayish brown fine sandy loam 11 inches thick. The subsoil is 43 inches thick. It is light brownish gray sandy clay loam in the upper part, grayish brown sandy clay loam in the middle part, and gray sandy clay loam in the lower part. The underlying material to a depth of 80 inches is light gray sandy loam and fine sand.

Surface runoff is slow. Permeability is moderate, and the available water capacity is moderate. The surface and subsurface layers range from very strongly acid to slightly acid unless the surface layer has been limed. The subsoil ranges from slightly acid to moderately alkaline. The seasonal high water table is 0.5 to 1 foot below the surface. This soil is subject to ponding for short periods.

Included with this soil in mapping are small areas of Muckalee and Rains soils. Also included are a few areas of a somewhat poorly drained soil and a few areas of a poorly drained, clayey soil that is neutral in reaction. These soils are intermingled throughout the map unit. The included soils make up 20 percent of this map unit.

Grifton soil is mostly in woodland. The vegetation is adapted to wetness. The main canopy trees are loblolly pine, pond pine, sweetgum, blackgum, water tupelo, yellow-poplar, sycamore, southern redcedar, swamp chestnut oak, red maple, willow oak, and water oak. Some areas of this soil have been ditched, bedded, and planted to loblolly pine. The understory includes redbay, sweetbay, American holly, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, and greenbrier. These poorly drained areas are important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, and other wildlife.

A few areas of this soil have been artificially drained and are used for cropland. Corn, soybeans, and small grains are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned

Figure 10.—Corn planted in small grain residue on Goldsboro fine sandy loam, 0 to 2 percent slopes.

and constructed drainage system can reduce wetness. Drainage systems commonly include open ditches, tile, and land grading to eliminate small depressions that pond.

This soil is generally not used for residential or recreational development because of wetness.

This soil is in capability subclass VIw, undrained; IIIw, drained; and woodland group 2w.

Jo—Johns fine sandy loam. This nearly level, somewhat poorly drained and moderately well drained soil is on stream terraces. Most of the mapped areas are on the Waccamaw River flood plain. Most of the acreage of this map unit is in woodland; a small acreage is in cropland. Individual areas of this soil are irregular in shape and range from 5 to 125 acres.

Typically, the surface layer is dark grayish brown fine sandy loam 4 inches thick. The subsurface layer, 9 inches thick, is pale brown fine sandy loam in the upper part and brownish yellow fine sandy loam in the lower part. The subsoil is 25 inches thick. It is yellowish brown sandy clay loam in the upper part, light yellowish brown sandy clay loam in the middle part, and light brownish gray sandy clay loam in the lower part. The underlying material to a depth of 70 inches is mottled gray, light

yellowish brown, and brownish yellow loamy sand in the upper part and light gray sand in the lower part.

Surface runoff is slow. Permeability is moderate, and the available water capacity is moderate. Ditchbanks cave below the thin subsoil. This soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 1.5 to 3 feet below the surface.

Included with this soil in mapping are small, intermingled areas of Pactolus and Lumbee soils in depressions. The included soils make up about 20 percent of this map unit.

Johns soil is mostly in woodland. The vegetation is adapted to wetness. The main canopy trees are loblolly pine, sweetgum, blackgum, southern red oak, white oak, yellow-poplar, sycamore, southern redcedar, red maple, willow oak, and water oak. Large areas of this soil have been ditched, bedded, and planted to loblolly pine. The understory includes American holly, gallberry, dwarf azalea, sourwood, dogwood, sweet pepperbush, switchcane, waxmyrtle, blueberry, and greenbrier. These moderately well drained and somewhat poorly drained areas are important as habitat for deer, raccoons, fox, rabbit, bobcat, black bear, opossum, birds, and other wildlife.

A few large areas of this soil have been artificially drained and are used for cropland. Corn, soybeans, and small grains are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can reduce wetness. Drainage systems commonly include open ditches, tile, and land grading to eliminate small depressions that pond.

This soil is generally too wet for residential or recreational development without artificial drainage and land grading to improve surface runoff.

This soil is in capability subclass IIw and woodland group 2w.

KrB—Kureb fine sand, 1 to 8 percent slopes. This excessively drained soil is in undulating areas. Nearly all of the acreage is in woodland. Individual areas of this soil are generally long and irregular in width, and the convex slopes are longer on the side nearest the drainageway. The mapped areas range from 30 to 100 acres, and a few areas on the southeastern side of the county are up to 1,000 acres.

Typically, the surface layer is gray fine sand 4 inches thick. The subsurface layer is light gray fine sand 16 inches thick. The underlying material to a depth of 80 inches is brownish yellow fine sand in the upper part and light yellowish brown fine sand in the lower part (fig. 11).

Surface runoff is slow. Permeability is rapid, and the available water capacity is very low. Seepage is rapid, and trench walls and ditchbanks cave. The soil ranges from strongly acid to neutral throughout, unless the surface layer has been limed.

Figure 11.—Profile of Kureb fine sand, 1 to 8 percent slopes, showing the albic subsurface horizon fingering into the underlying C/Bh horizon.

Included with this soil in mapping are small areas of Wando and Blanton soils and a soil that has a hardpan between depths of 35 to 60 inches. These soils are intermingled throughout this map unit. Also included are small areas of Baymeade, Mandarin, Leon, and Murville soils. Baymeade, Mandarin, and Leon soils are in narrow depressions. Murville soils are in narrow, wet drainageways. The included soils make up about 15 percent of this map unit and have higher potential for woodland than the Kureb soil.

Kureb soil has sparse native vegetation adapted to droughty conditions. The native trees are longleaf pine, turkey oak, bluejack oak, blackjack oak, and live oak. The understory includes pineland threeawn, panicum grasses, and sassafras. Some areas are barren of any vegetation except lichens, mosses, and scattered turkey oak. The barren areas of this soil are poor habitat for animals. Seedling mortality and difficulty using equipment on sand are the main limitations.

This soil is suited to most urban uses. Lawns and shrubs are difficult to establish and maintain because of leaching of plant nutrients and droughtiness. Irrigating, fertilizing frequently, and adding organic matter increase growth of lawns and shrubs. Caving of ditchbanks and trench walls and seepage are other urban problems. This soil is poorly suited to recreational uses because of the sandy nature of the soil.

This soil is in capability subclass VIIs and woodland group 5s.

LA—Lafitte muck. This is a very poorly drained soil on flood plains at elevations less than 5 feet above sea level. The larger areas are near the mouth of the Cape Fear River and along the Elizabeth River. These mapped areas are inaccessible, and observations were not as detailed as those of other map units. Individual areas of this soil are long and irregular in width and range from 20 to 500 acres.

Typically, the muck layers, 55 inches thick, are dark brown, black, very dark brown, and very dark gray. The underlying material to a depth of 72 inches is gray silty clay.

Surface runoff is very slow. This soil has moderately rapid permeability and high volume change when it dries. The soil ranges from neutral to moderately alkaline throughout. The water table is at or near the surface. This soil is flooded daily by tides.

Included with this soil in mapping are narrow areas of Carteret soils and small areas of a soil that has thin muck near the stream banks. Small areas of Bohicket soils also are intermingled with these soils. The included soils make up about 15 percent of this map unit.

The main vegetation is black needlerush, smooth cordgrass, and big cordgrass. Sparse stands of baldcypress and water tupelo grow near the edges joining the mainland. This soil is mostly used for wetland wildlife. It is well suited to wetland plants.

This soil is generally not used for cropland or woodland or for residential or recreational development. The main limitations are daily tidal flooding, excess humus, and low strength.

This soil is in capability subclass VIIIw.

Lo—Leon fine sand. This nearly level, poorly drained soil is in broad, smooth, interstream areas and in depressions in undulating areas. Most of the acreage of this map unit is in woodland. A small acreage is used for blueberries. Most of the mapped areas are in the southern part of the county. Individual areas of this soil are irregular in shape and range from 10 to 200 acres. A few areas in the southeastern part of the county are up to 900 acres.

Typically, the surface layer is dark gray fine sand 6 inches thick. The subsurface layer is light gray fine sand 8 inches thick. The subsoil is black and dark reddish brown fine sand 9 inches thick. The underlying material to a depth of 80 inches is light gray fine sand in the upper part, black and brown fine sand in the middle part, and black fine sand in the lower part.

Surface runoff is slow. Permeability is rapid in the surface layer and moderate to rapid in the subsoil. The available water capacity is low. When artificially drained, the subsoil exhibits properties of a weakly cemented pan and may restrict some root penetration. Ditchbanks cave, and the soil has a high seepage rate. The soil is extremely acid or very strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is at or near the surface.

Included with this soil in mapping are small areas of Murville soils in depressions and a soil having a thicker surface layer than is typical for Murville soil. Tomahawk and Mandarin soils are on low ridges and in positions near drainageways. The included soils make up about 20 percent of this map unit.

Leon soil is mostly in woodland. The vegetation is adapted to wetness and a hardpan that limits root growth. The main canopy trees are longleaf pine, pond pine, loblolly bay, sweetbay, redbay, sweetgum, blackgum, and red maple. The understory includes pineland threeawn, panicum, bluestem, American holly, gallberry, huckleberry, waxmyrtle, blueberry, greenbrier and sphagnum moss. These poorly drained areas are fair to poor as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, black bear, and other wildlife. Large areas of this soil have been ditched, bedded, and planted to loblolly pine or longleaf pine.

A few small areas of this soil have been artificially drained and are used for cropland. Blueberries are the main crop (fig. 12). Leaching of plant nutrients, seasonal high water table, and caving of cutbanks are the main limitations.

This soil is generally not used for residential or recreational development because of wetness, seepage, the sandy nature of the soil, and caving of cutbanks.

This soil is in capability subclass IVw and woodland group 4w.

Lu—Lumbee fine sandy loam. This nearly level, poorly drained soil is on stream terraces. Nearly all the acreage of this map unit is in woodland. Most of the mapped areas are on the Waccamaw River flood plain. Individual areas of this soil are long and narrow and range from 5 to 100 acres. A few broad areas are up to 450 acres.

Typically, the surface layer is very dark gray fine sandy loam 6 inches thick. The subsurface layer is light brownish gray fine sandy loam 12 inches thick. The subsoil, 20 inches thick, is gray sandy clay loam. The underlying material to a depth of 80 inches is mottled white, gray, and yellow sand.

Surface runoff is very slow. Permeability is moderate, and the available water capacity is moderate. Banks of deep ditches cave because of sand underlying the thin

Figure 12.—Blueberries on Leon fine sand near Shallote.

subsoil. This soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is at or near the surface. Most of the acreage of this map unit is rarely flooded by shallow stream overflow.

Included with this soil in mapping are small intermingled areas of Johns soils, and small areas of a very poorly drained soil with a thick mucky loam surface layer. The included soils make up about 20 percent of this map unit.

Lumbee soil is mostly in woodland. The vegetation is adapted to wetness. The main canopy trees are loblolly pine, pond pine, sweetgum, blackgum, yellow-poplar, sycamore, southern redcedar, swamp chestnut oak, red maple, willow oak, and water oak. Large areas of this soil have been ditched, bedded, and planted in loblolly

pine. The understory includes redbay, sweetbay, American holly, gallberry, switchcane, waxmyrtle, blueberry, and greenbrier. These poorly drained areas are important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, black bear, birds, and other wildlife.

A few areas of this soil have been artificially drained and are used for cropland. Corn and soybeans are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can reduce wetness. Drainage systems commonly include open ditches, tile, and land grading to eliminate small depressions that pond.

This soil is generally not used for residential or recreational development because of wetness, seepage, and flooding.

This soil is in capability subclass VIw, undrained; IIIw, drained; woodland group 2w.

Ly—Lynchburg fine sandy loam. This nearly level, somewhat poorly drained soil is in interstream areas. Most of the acreage of this map unit is in woodland; the rest is in cropland. Areas of this soil are throughout most of the county. The larger areas of this soil are in broad, interstream areas and range from 25 to 150 acres. The smaller areas are in shallow depressions on slightly convex divides and are 5 to 25 acres. Generally, the mapped areas are long and irregular in width.

Typically, the surface layer is dark gray fine sandy loam 9 inches thick. The subsoil is 55 inches thick. It is light yellowish brown fine sandy loam in the upper part and gray sandy clay loam in the lower part. The underlying material to a depth of 80 inches is gray clay loam.

Surface runoff is slow. Permeability is moderate, and the available water capacity is moderate. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 0.5 foot to 1.5 feet below the surface.

Included with this soil in mapping are small areas of Goldsboro and Rains soils and a soil having a sandy loam subsoil. Goldsboro soils are near the drainageways, and Rains soils are in slight depressions. The included soils make up about 15 percent of this map unit.

Lynchburg soil is mostly in woodland. The vegetation is adapted to wetness. The main canopy trees are loblolly pine, sweetgum, blackgum, southern red oak, white oak, yellow-poplar, sycamore, southern redcedar, red maple, willow oak, and water oak. Large areas of this soil have been ditched, bedded, and planted to loblolly pine. The understory includes American holly, gallberry, dwarf azalea, dogwood, sweet pepperbush, switchcane, waxmyrtle, blueberry, and greenbrier. These somewhat poorly drained areas are important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, and other wildlife.

A few large areas of this soil have been artificially drained and are used for cropland. Corn, soybeans, and small grains are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can reduce wetness. Drainage systems commonly include open ditches, tile, and land grading to eliminate small depressions that pond.

This soil is generally too wet for residential or recreational development without artificial drainage and land grading to improve surface runoff.

This soil is in capability subclass IIw and woodland group 2w.

Ma—Mandarin fine sand. This nearly level, somewhat poorly drained soil is in broad interstream areas and in depressions in undulating areas. Most of the acreage of this map unit is in woodland, primarily in the southern part of the county. Individual areas of this soil are irregular in shape and range from 5 to 200 acres.

Typically, the surface layer is gray fine sand 5 inches thick. The subsurface layer is white fine sand 13 inches thick. The subsoil is dark brown and black fine sand 17 inches thick. The underlying material to a depth of 80 inches is light gray and black fine sand in the upper part, dark reddish brown fine sand in the middle part, and dark reddish brown sand in the lower part.

Surface runoff is slow. Permeability is moderate to rapid, and the available water capacity is low. Ditchbanks cave and the rate of seepage is high. When artifically drained, the subsoil may exhibit properties of a weakly cemented pan and restrict some root penetration. The soil is extremely acid or very strongly acid in the surface and subsurface layers and in the upper part of the subsoil unless the surface layer has been limed. The lower part of the subsoil ranges from very strongly acid to neutral. The seasonal high water table is 1.5 to 3.5 feet below the surface.

Included with this soil in mapping are small areas of Leon and Tomahawk soils that are intermingled throughout this map unit. Also included are small areas of Murville soils in narrow drainageways. The included soils make up about 20 percent of this map unit.

Mandarin soil is mostly in woodland. The vegetation is adapted to wetness in the winter and droughtiness in the summer. The main canopy trees are longleaf pine, sweetgum, blackgum, turkey oak, blackjack oak, and southern red oak. A few areas of this soil have been bedded and planted to loblolly pine. The understory includes dwarf azalea, American holly, gallberry, huckleberry, waxmyrtle, blueberry, greenbrier, and lichens. These areas are important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, and other wildlife.

A few areas of this soil are used for cropland. Corn and soybeans are the main crops. The soil is droughty in summer. Cover crops and crop residue management help reduce leaching.

This soil is poorly suited to residential or recreational development. Wetness, seepage, caving of cutbanks, and the sandy nature of the soil are the main limitations.

This soil is in capability subclass VIs and woodland group 4s.

Mk—Muckalee loam. This nearly level, poorly drained soil is on flood plains of freshwater streams. Nearly all of the acreage of this map unit is in woodland. Individual areas of this soil are long and narrow. Most of the mapped areas are from 10 to 100 acres.

Typically, the surface layer is very dark grayish brown loam 6 inches thick. The underlying material to a depth of 65 inches is grayish brown loamy sand in the upper part and gray sandy loam and loamy sand in the lower part.

Surface runoff is very slow. Permeability is moderate, and the available water capacity is moderate. Ditchbanks cave because of the high sand content. The soil ranges from strongly acid to slightly acid in the surface layer and medium acid to neutral in the underlying material. The seasonal high water table is 0.5 foot to 1.5 feet below the surface most of the year. This soil is flooded frequently for brief periods. On the wide flood plains, water ponds in the low places for a long time during wet periods.

Included with this soil in mapping are small areas of a soil that has a thick mucky loam surface layer. This included soil makes up about 25 percent of this map unit.

Muckalee soil is mostly in native woodlands. The vegetation is adapted to long periods of wetness. The main canopy trees are sweetgum, blackgum, yellow-poplar, water tupelo, Atlantic white-cedar, swamp chestnut oak, red maple, willow oak, water oak, pond pine, and baldcypress. A few areas of this soil have been ditched, bedded, and planted to loblolly pine. The understory includes redbay, sweetbay, American holly, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, honeysuckle, Virginia chain fern, cinnamon fern, poison-ivy, bracken, greenbrier, and sphagnum moss. This soil is important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, mink, otter, squirrels, birds, and other wildlife.

This soil is generally not used for cropland, or for residential or recreational development because of surface ponding, flooding, and caving of cutbanks.

This soil is in capability subclass Vw and woodland group 2w.

Mu—Murville mucky fine sand. This nearly level, very poorly drained soil is in depressions in broad interstream areas primarily in the southern part of the county. Nearly all of the acreage of this map unit is in woodland. The soil is in oval-shaped depressions and long, narrow depressions between sand ridges. Most of the mapped areas range between 25 and 100 acres. Some areas in the southeastern part of the county are up to 400 acres.

Typically, the surface layer is black mucky fine sand 5 inches thick. The subsoil to a depth of 80 inches is black and dark reddish brown fine sand.

Surface runoff is very slow. Permeability is rapid in the surface layer and moderately rapid in the subsoil. The available water capacity is low. When artifically drained, the subsoil may exhibit properties of a weakly cemented pan that may restrict some root penetration. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is at or near the surface.

Included with this soil in mapping are intermingled areas of Murville soils that have a fine sand surface layer. Also included is a soil that has a thin, light gray subsurface layer and some small areas of Leon, Torhunta, and Croatan soils. The included soils are in small areas intermingled with this soil and make up about 20 percent of this map unit.

Murville soil is mostly in woodland. The vegetation is adapted to wetness. The main canopy trees are pond pine (fig. 13), water tupelo, sweetgum, yellow-poplar, red maple, and baldcypress. Large areas of this soil have been ditched, bedded, and planted to loblolly pine. Important understory includes redbay, sweetbay, loblolly bay, gallberry, titi, southern bayberry, sweet pepperbush, waxmyrtle, blueberry, greenbrier, and sphagnum moss. This soil is important as habitat for deer, raccoons, fox, rabbit, bobcat, black bear, opossum, birds, and other wildlife.

A small acreage of this soil has been artificially drained and is used for cropland. Corn and soybeans are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can reduce wetness. Drainage systems include open ditches, tile, and land grading and "crowning" to eliminate small depressions that pond.

This soil is generally not used for residential or recreational development. Surface ponding, high rates of seepage, and caving of cutbanks are the main limitations.

This soil is in capability subclass Vw and woodland group 2w.

NeE—Newhan fine sand, 2 to 30 percent. This excessively drained soil is on ridges between the beach and the inland side of the coastal area. Some areas of this soil have vertical slopes joining the beach. Elevations range from 5 to 30 feet. About one-fourth of the acreage of this soil has been leveled and is used for residential developments. The remaining acreage is undulating and in maritime vegetation. Individual areas of this soil are long and narrow and range from 300 to 500 acres.

Figure 13.—Native vegetation of pond pine, titi, and greenbrier on Murville mucky fine sand near Southport.

Typically, the surface layer is grayish brown fine sand 1 inch thick. The underlying material is light gray fine sand to a depth of 80 inches.

Surface runoff is slow. Permeability is very rapid, and the available water capacity is very low. This soil has a very high rate of seepage, and trench walls cave. The soil is neutral or mildly alkaline throughout.

Included with this soil in mapping are some small areas of Corolla soils in depressions and a narrow, smooth strip of beach. The included soils make up about 25 percent of this map unit.

The main native vegetation is seaoats, seacoast bluestem, American beachgrass, yaupon holly, waxmyrtle, and live oak. There are almost no canopy trees. The wildlife species that occasionally use these

areas are white-tailed deer, raccoons, loggerhead turtle, cottontail rabbit, eastern brown pelican, least tern, and bobwhite quail.

This soil is poorly suited to recreational and residential development. Slope, high seepage rates, caving of cutbanks, and sandiness are the main limitations. Lawns and shrubs are difficult to establish and maintain because of leaching of plant nutrients and droughtiness.

This soil is in capability subclass VIIIs.

NhE—Newhan fine sand, dredged, 2 to 30 percent slopes. This map unit consists of excessively drained, sandy dredge spoil. This soil is near the edges of the mainland and near the Cape Fear River. The small areas are cone-shaped, and the large areas are irregularly shaped and have a dike surrounding the dredge spoil (fig. 14). Soil surfaces are undulating inside the diked areas and sloping on the edges of the areas. The mapped areas range from 25 to 100 acres.

Typically, the surface layer is light gray fine sand 14 inches thick and has many fine to medium shell fragments. The subsurface soil to a depth of 80 inches is light gray fine sand and has about 3 percent fine and medium shell fragments.

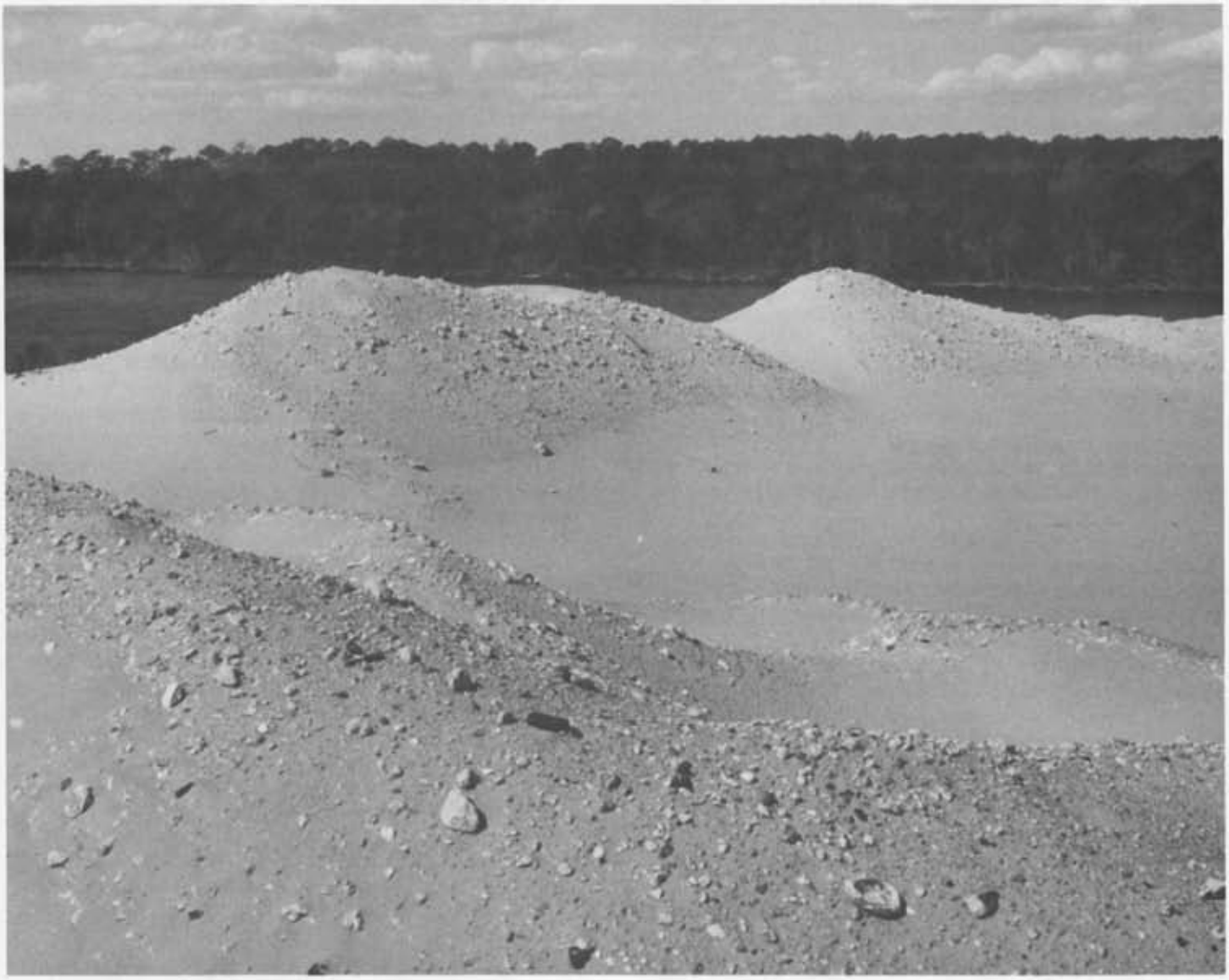


Figure 14.—Mounds of Newhan fine sand, dredged, 2 to 30 percent slopes, with high marl content, on Eagle Island.

Surface runoff is slow. Permeability is rapid, and the available water capacity is low. This soil ranges from slightly acid to moderately alkaline throughout. The seasonal high water table is about 4 feet below the surface.

Included with this soil in mapping are some areas that have thin strata of loamy and clayey sediment in the sandy subsurface and some areas of thin, sandy dredge spoil overlying clayey Bohicket soils. Also, some areas have small inclusions of Yaupon soils. Included soils make up about 20 percent of this map unit.

The main native vegetation includes seaoats, seacoast bluestem, American beachgrass, yaupon, waxmyrtle, redcedar, and live oak. There are almost no canopy trees. The wildlife species that occasionally use these areas are white-tailed deer, raccoons, loggerhead turtle, cottontail rabbit, eastern brown pelican, least tern, and bobwhite quail.

This soil is poorly suited to residential or recreational uses because of slope, high seepage rates, caving of cutbanks, and sandiness.

This soil is in capability subclass VIIIs.

NoB—Norfolk loamy fine sand, 2 to 6 percent slopes. This well drained soil is on convex interstream divides. Most of the acreage of this map unit is in cropland or is used for residential sites. Individual areas of this soil are long and irregular in width and range from 15 to 100 acres.

Typically, the surface layer is dark grayish brown loamy fine sand 5 inches thick. The subsurface layer is light yellowish brown loamy fine sand 11 inches thick. The subsoil to a depth of 80 inches is yellowish brown sandy clay loam in the upper part, brownish yellow sandy clay loam in the middle part, and brownish yellow sandy loam in the lower part.

Surface runoff is medium. Permeability is moderate, and the available water capacity is moderate. This soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 4 to 6 feet below the surface.

Included with this soil in mapping are Goldsboro, Foreston, Muckalee, and Baymeade soils and small areas of a soil that is eroded. Goldsboro and Foreston soils are intermingled in this map unit. Baymeade soils are near drainageways. Muckalee soils are in narrow drainageways. The small eroded areas are in areas that have slightly steeper slopes. The included soils make up about 15 percent of this map unit.

Norfolk soil has a small acreage of native woodland. The main canopy trees are loblolly pine, longleaf pine, red oak, white oak, and hickory. The understory includes holly, dogwood, persimmon, blueberry, black cherry, and greenbrier. Openland and woodland areas of this soil are good habitat for deer, rabbit, fox, quail, and other wildlife.

This soil is well suited to crops. Most of the soil is planted to tobacco, corn, and soybeans. Addition of plant nutrients, and the use of minimum tillage, cover crops, contour cultivation, and crop residue management are some conservation practices applied to this map unit to reduce erosion and conserve moisture.

This soil is suited to urban uses. Wetness is the main limitation. It is well suited to recreational uses.

This soil is in capability subclass IIe and woodland group 2o.

On—Onslow fine sandy loam. This nearly level, moderately well drained soil is near drainageways in interstream areas. Most of the acreage of this map unit is in woodland; the rest is in cropland. Individual areas of this soil are long and irregular in width and range from 15 to 70 acres.

Typically, the surface layer is dark grayish brown fine sandy loam 3 inches thick. The subsurface layer, 19 inches thick, is pale brown fine sandy loam in the upper part; light yellowish brown fine sandy loam in the middle part; and pale brown fine sandy loam in the lower part. The subsoil to a depth of 80 inches is mottled strong brown, brownish yellow, light brownish gray, and light yellowish brown sandy clay loam in the upper part and light brownish gray and gray sandy clay loam in the lower part.

Surface runoff is slow. Permeability is moderate, and the available water capacity is moderate. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 1.5 to 3 feet below the surface.

Included with this soil in mapping are small areas of Goldsboro and Foreston soils. They are intermingled throughout this map unit. Also included are some small areas of Baymeade and Rains soils. Baymeade soils are near drainageways, and Rains soils are in interstream areas and slight depressions. The included soils make up about 25 percent of this map unit.

Onslow soil has some large areas in woodland. The main canopy trees are loblolly pine, sweetgum, blackgum, southern red oak, white oak, yellow-poplar, sycamore, southern redcedar, red maple, hickory, willow oak, and water oak. Large areas of this soil have been bedded and planted to loblolly pine. The understory includes American holly, gallberry, dwarf azalea, sourwood, dogwood, huckleberry, persimmon, black cherry, waxmyrtle, blueberry, and greenbrier. These areas are important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, and other wildlife.

Many areas of this soil are used for cropland. Corn, soybeans, tobacco, and small grains are the main crops. Wetness from a seasonal high water table is the main limitation. Artificial drainage helps control wetness and improves aeration in the lower part of the root zone. Drainage systems commonly include open ditches, tile, and land grading to eliminate depressions that pond.

This soil is poorly suited to residential and recreational development because of wetness. Some areas need

artificial drainage or land grading to improve surface drainage.

This soil is in capability subclass IIw and woodland group 3o.

PaA—Pactolus fine sand, 0 to 2 percent slopes. This moderately well drained and somewhat poorly drained soil is in slight depressions and on terraces. Nearly all of the acreage of this map unit is in woodland. Individual areas of this soil are in the southern and western parts of the county. They are oblong and range from 10 to 150 acres.

Typically, the surface layer is gray and grayish brown fine sand 10 inches thick. The underlying material to a depth of 80 inches is fine sand. It is very pale brown in the upper part; mottled light gray, very pale brown, and brownish yellow in the middle part; and light yellowish brown in the lower part.

Surface runoff is slow. Permeability is rapid, and the available water capacity is low. This soil has a very high rate of seepage, and trench walls cave. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 1.5 to 2.5 feet below the surface.

Included with this soil in mapping are small areas of Wando soils on low ridges and Leon soils in small depressions. The included soils make up about 20 percent of this map unit.

Pactolus soil is mostly in woodland. The forest vegetation is adapted to wetness in the winter and droughtiness in the summer. The main canopy trees are loblolly pine, longleaf pine, sweetgum, blackgum, yellow-poplar, sycamore, southern redcedar, red maple, southern red oak, and white oak. A few areas of this soil have been bedded and planted in loblolly pine. The understory includes dwarf azalea, American holly, gallberry, huckleberry, waxmyrtle, sassafras, blueberry, greenbrier, and lichens. This soil is important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, and other wildlife.

A few areas of this soil are used for cropland. Corn, soybeans, and small grains are the main crops. The soil is droughty in summer. Cover crops and crop residue management help reduce leaching.

This soil is poorly suited to residential and recreational development because of wetness, seepage, caving of cutbanks, and the sandy nature of the soil.

This soil is in capability subclass IIIs and woodland group 3w.

Pn—Pantego mucky loam. This nearly level, very poorly drained soil is in broad interstream areas. Nearly all the acreage of this map unit is in woodland. Most of this soil is in the north-central part of the county. Individual areas of this soil are generally broad and range in size from 10 to 150 acres but can range up to 1,500 acres.

Typically, the surface layer is black mucky loam 11 inches thick. The subsurface layer is dark gray loam 4 inches thick. The subsoil is dark gray sandy clay loam 49 inches thick. The underlying material to a depth of 80 inches is gray sandy loam.

Surface runoff is very slow. Permeability is moderate, and the available water capacity is moderate. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is at or near the surface.

Included with this soil in mapping are small intermingled areas of Pantego soils that have a loam or fine sandy loam surface layer. Also included are small areas of the Torhunta, Woodington, and Rains soils. Woodington and Rains soils are on the outer edges of the mapped areas, and Torhunta soils are in small intermingled areas. The included soils make up about 20 percent of this map unit.

Pantego soil is mostly in woodland. The forest vegetation is adapted to wetness. The main canopy trees are loblolly pine, pond pine, sweetgum, water tupelo, yellow-poplar, sycamore, swamp chestnut oak, red maple, willow oak, Atlantic white-cedar, and baldcypress. Large areas of this soil have been ditched, bedded, and planted to loblolly pine. The understory includes redbay, sweetbay, loblolly bay, American holly, gallberry, southern bayberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, titi, greenbrier, and sphagnum moss. This soil is important as habitat for deer, raccoons, fox, black bear, rabbit, bobcat, opossum, birds, and other wildlife.

A few areas of this soil have been artificially drained and are used for cropland. Corn and soybeans are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system reduces wetness. Drainage systems commonly include open ditches, tile, and land grading and "crowning" to eliminate small depressions that pond.

This soil is generally not used for residential or recreational development. Wetness and seepage are the main limitations.

This soil is in capability subclass VIw undrained, IIIw drained, and woodland group 1w.

Pt—Pits. This map unit consists of areas where the original surface material has been or is currently being removed. Individual areas range from 5 to 40 acres.

The pits range from 5 to 15 feet deep. The material excavated is typically sand, sandy loam, or sandy clay loam and marl. The remaining soil material is generally sandy and wet. The more recently excavated areas are bare and subject to accelerated erosion. Other areas have become naturally stabilized under pine and other vegetation. The surface relief ranges from smooth to highly irregular.

Onsite investigations of this map unit should be made before proceeding with any land-use practice.

This map unit is not assigned to a capability subclass nor to a woodland group.

Ra—Rains fine sandy loam. This nearly level, poorly drained soil is on broad, smooth interstream areas and in depressions on slightly convex divides. This soil is throughout the county. Most of the acreage of this map unit is in woodland; a small acreage is in cropland. The larger individual areas of this soil are in broad, smooth interstream areas and range from 100 to 600 acres. The smaller areas are in shallow depressions on slightly convex divides and range from 10 to 40 acres.

Typically, the surface layer is very dark gray fine sandy loam 4 inches thick. The subsurface layer is dark gray fine sandy loam 11 inches thick. The subsoil is gray sandy clay loam 57 inches thick. The underlying material to a depth of 80 inches is light gray sandy clay loam.

Surface runoff is slow. Permeability is moderate, and the available water capacity is moderate. This soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is at or near the surface. The soil is subject to occasional ponding of surface water in low places for brief periods.

Included with this soil in mapping are small intermingled areas of Woodington and Grifton soils. Also included are small areas of Lynchburg soils along the outer edge of the map unit near drainageways and Pantego soils in small, shallow depressions. The included soils make up about 15 percent of this map unit.

Rains soil is mostly in woodland. The forest vegetation is adapted to wetness. The main canopy trees are loblolly pine, pond pine, sweetgum, blackgum, yellow-poplar, sycamore, southern redcedar, swamp chestnut oak, red maple, willow oak, and water oak. Large areas of this soil have been ditched, bedded, and planted to loblolly pine. The understory includes redbay, sweetbay, American holly, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, and greenbrier. This soil is important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, black bear, birds, and other wildlife.

A few large areas of this soil have been artificially drained and are used for cropland. Corn and soybeans are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can reduce wetness. Drainage systems commonly include open ditches, tile, and land grading to eliminate small depressions that pond.

This soil is generally not used for residential or recreational development. Wetness is the main limitation.

This soil is in capability subclass IVw undrained; IIIw drained and woodland group 2w.

Tm—Tomahawk loamy fine sand. This nearly level, moderately well drained and somewhat poorly drained soil is on low, slightly convex ridges. Most of the acreage of this map unit is in woodland; the rest is in cropland. Individual areas of this soil are long and narrow and usually are less than 75 acres.

Typically, the surface layer is dark grayish brown loamy fine sand 6 inches thick. The subsurface layer is light yellowish brown loamy fine sand 6 inches thick. The subsoil is 53 inches thick. It is brownish yellow fine sandy loam in the upper part, yellowish brown loamy fine sand in the middle part, and dark reddish gray and dark reddish brown fine sand in the lower part. The underlying material to a depth of 80 inches is grayish brown sand.

Surface runoff is slow. Permeability is moderately rapid in the sandy surface and subsurface layers and moderate to moderately rapid in the subsoil. The available water capacity is moderate. This soil has high seepage, and ditchbanks and trench walls cave. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is between 1.5 and 3 feet below the surface.

Included with this soil in mapping are small intermingled areas of Foreston soils. There are also small areas of Leon and Woodington soils in depressions and Baymeade soils near drainageways. The included soils make up about 20 percent of this map unit.

Tomahawk soil is mostly in woodland. The forest vegetation is adapted to moderate wetness. The main canopy trees are loblolly pine, sweetgum, blackgum, southern red oak, white oak, yellow-poplar, sycamore, southern redcedar, red maple, willow oak, and water oak. Large areas of this soil have been ditched, bedded, and planted to loblolly pine. The understory includes American holly, gallberry, sweet pepperbush, dwarf azalea, sourwood, dogwood, switchcane, waxmyrtle, blueberry, and greenbrier. This soil is important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, and other wildlife.

A few large areas of this soil have been artificially drained and are used for cropland. Corn, soybeans, and small grains are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can reduce wetness. Drainage systems commonly include open ditches, tile, and land grading to eliminate depressions that pond.

This soil is generally too wet for residential or recreational development without artificial drainage and land grading to improve surface runoff. The sandy nature of the soil, seepage, and caving of cutbanks are also limitations.

This soil is in capability subclass IIw and woodland group 3w.

To—Torhunta mucky fine sandy loam. This nearly level, very poorly drained soil is in broad interstream areas and on stream terraces. Nearly all of the acreage of this map unit is in woodland. The largest areas are in the north-central part of the county and range from 100 to 1,500 acres.

Typically, the surface layer is black mucky fine sandy loam 11 inches thick. The subsurface layer is dark grayish brown fine sandy loam 11 inches thick. The subsoil is grayish brown fine sandy loam 28 inches thick. The underlying material to a depth of 80 inches is light gray loamy sand.

Surface runoff is very slow. The soil has moderately rapid permeability, and the available water capacity is moderate. Ditchbanks and trench walls cave, and the seepage rate is high. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 0.5 foot to 1.5 feet below the surface, and water may pond during the wet season for brief periods.

Included with this soil in mapping are small intermingled areas of Pantego, Murville, and Croatan soils and Torhunta soils that have a fine sandy loam surface layer. Small areas of Woodington soils are on the outer edges of the map units near shallow drainageways. Also included is a soil that is sandy clay loam between depths of 40 and 60 inches. A soil that has a dark surface layer ranging from 20 to 40 inches thick is commonly adjacent to the Croatan soils. The included soils make up about 25 percent of this map unit.

Torhunta soil is mostly in woodland. The forest vegetation is adapted to wetness. The main canopy trees are loblolly pine, pond pine, sweetgum, water tupelo, yellow-poplar, Atlantic white-cedar, sycamore, swamp chestnut oak, red maple, willow oak, baldcypress, and water oak. Large areas of this soil have been ditched, bedded, and planted to loblolly pine. The understory includes redbay, sweetbay, American holly, southern bayberry, titi, river birch, gallberry, fetterbush, sweet pepperbush, switchcane, waxmyrtle, blueberry, greenbrier, and sphagnum moss. This soil is important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, black bear, birds, and other wildlife.

A few areas of this soil have been drained and are used for cropland. Corn and soybeans are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can reduce wetness. Drainage systems commonly include open ditches, tile, and land grading and "crowning" to eliminate depressions that pond.

This soil is generally not used for residential or recreational development because of wetness. Seepage and caving of cutbanks are also limitations.

This soil is in capability subclass Vlw undrained; IIIw drained and woodland group 2w.

Ur—Urban land. This map map unit consists of areas that are more than 85 percent covered by buildings, houses, streets, parking lots, airports, railroad yards, and other urban development. Because of the extensive urbanization, the natural soils have been altered, and the topography and original landscape have been changed. Slope is commonly 0 to 6 percent.

Most of the urban land is scattered throughout the county in small towns and industrial sites. These areas are irregular in shape and range from 5 to more than 50 acres.

Nearly all of the precipitation that falls on this map unit runs off. This increases the flood hazard in low-lying areas. There is a possibility of waterway and reservoir siltation from areas that are graded and not stabilized.

Recommendations for use and management of soil and water in this map unit require onsite investigation.

This map unit has not been assigned to a capability subclass nor to a woodland group.

WaB—Wando fine sand, 0 to 6 percent slopes. This excessively drained soil is on interstream areas. Most of the acreage of this map unit is in woodland. Some small areas are used for residential sites. These mapped areas are near the coast. Individual areas of this soil are long and irregular in width and range from 100 to 500 acres.

Typically, the surface layer is dark brown fine sand 8 inches thick. The underlying material to a depth of 99 inches is strong brown fine sand in the upper part and yellow fine sand in the lower part.

Surface runoff is slow. Permeability is rapid, and the available water capacity is low or very low. This soil has rapid seepage, and trench walls cave. This soil ranges from strongly acid to neutral in the surface and subsurface layers, unless the surface layer has been limed. The underlying material ranges from very strongly acid to neutral.

Included with this soil in mapping are small intermingled areas of Pactolus and Kureb soils. Also included are a few intermingled areas of Mandarin, Baymeade, and Leon soils. A large part of the surface of many small areas adjacent to the Intracoastal Waterway is covered with oyster shell fragments. The included soils make up about 20 percent of this map unit.

Wando soil is mostly in native woodland. The vegetation is adapted to excessively drained, sandy soils. The main canopy trees are longleaf pine, loblolly pine, turkey oak, bluejack oak, live oak, blackjack oak, and sassafras. The understory includes pineland threeawn, panicum grasses, scrub oaks, and American beautyberry. Seedling mortality and difficulty using equipment on the dry, sandy surface are the main limitations. This soil is poor to fair habitat for animals.

A small acreage of this soil is used for crops. Droughtiness, leaching of plant nutrients, and wind erosion are the main limitations. Addition of plant nutrients, minimum tillage, use of cover crops, crop

residue management, and windbreaks help control wind erosion and reduce leaching.

This soil is suited to most urban uses. It is poorly suited to sanitary facilities because of seepage and caving of cutbanks. Lawns and shrubs are difficult to establish and maintain because of droughtiness and leaching of plant nutrients. Irrigating, fertilizing frequently, and adding organic matter will increase growth of lawns and shrubs on this sandy soil. This soil is poorly suited to recreational uses because it is too sandy.

This soil is in capability subclass IIIs and woodland group 3s.

WdB—Wando-Urban land complex, 0 to 6 percent slopes. This excessively drained soil is on uplands. This individual area is about 250 acres.

About 50 percent of this map unit is small undisturbed areas of Wando soils; about 40 percent is covered with buildings, streets, and parking lots.

The relatively undisturbed Wando soil has a dark brown fine sand surface layer 8 inches thick. The underlying material to a depth of 99 inches is strong brown fine sand in the upper part and yellow fine sand in the lower part.

Surface runoff is slow. Permeability is rapid, and the available water capacity is low to very low. This soil ranges from strongly acid to neutral in the surface and subsurface layers. It ranges from very strongly acid to neutral in the underlying material. Trench walls and cutbanks cave, and the rate of seepage is rapid.

The Urban land part of this map unit consists of soils that are covered with concrete, asphalt, buildings, or other impervious surfaces.

Included with this soil in mapping are small areas of Mandarin, Leon, and Kureb soils. Mandarin and Leon soils are in shallow depressions, and Kureb soils are on higher sand ridges in the northern part of Southport.

The open parts of these areas are used for parks, open space, building sites, lawns, gardens, trees, and shrubs. The sandy surface layer is easy to work, but plant nutrients leach readily. Large amounts of fertilizer, particularly nitrogen, are needed to establish and maintain lawns and vegetable and flower gardens. Erosion is a hazard where the surface layer is not protected.

The Wando soil is suited to most urban uses. It is poorly suited to sanitary facilities. Seepage and caving of cutbanks are the main limitations. Onsite investigation is generally needed to properly evaluate and plan the development of specific sites.

This map unit is not assigned to a capability subclass nor to a woodland group.

Wo—Woodington fine sandy loam. This nearly level, poorly drained soil is in broad, smooth interstream areas and in shallow depressions on slightly convex divides. Most of the acreage of this map unit is in woodland. Large tracts of this soil are in broad, smooth interstream areas ranging from 200 to 1,000 acres. Smaller areas are in shallow depressions on slightly convex divides. These mapped areas range from 10 to 100 acres and are irregular in shape.

Typically, the surface layer is very dark gray fine sandy loam 6 inches thick. The subsurface layer is gray fine sandy loam 8 inches thick. The subsoil is 56 inches thick. It is gray fine sandy loam in the upper part and light gray fine sandy loam and sandy loam in the lower part. The underlying material to a depth of 80 inches is light gray loamy sand.

Surface runoff is slow. Permeability is moderately rapid, and the available water capacity is moderate. Trench walls and ditchbanks cave, and seepage is rapid. This soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed. The seasonal high water table is 0.5 to 1 foot below the surface.

Included with this soil in mapping are small areas of Foreston, Rains, Leon, and Torhunta soils. Foreston soils are near drainageways. Torhunta and Rains soils and a few areas of Leon soils and a soil that has a thin, discontinuous hardpan in the subsurface layer are intermingled with this soil. The included soils make up about 20 percent of this map unit.

Woodington soil is mostly in woodland. The forest vegetation is adapted to wetness. The main canopy trees are loblolly pine, pond pine, sweetgum, blackgum, yellow-poplar, sycamore, southern redcedar, swamp chestnut oak, red maple, willow oak, and water oak. Large areas of this soil have been ditched, bedded, and planted to loblolly pine. The understory includes redbay, sweetbay, American holly, gallberry, switchcane, waxmyrtle, blueberry, and greenbrier. This soil is important as habitat for deer, raccoons, fox, rabbit, bobcat, opossum, black bear, birds, and other wildlife.

A few areas of this soil have been artificially drained and are used for cropland. Corn and soybeans are the main crops. Wetness from a seasonal high water table is the main limitation. A well planned and constructed drainage system can reduce wetness. Drainage systems commonly include open ditches, tile, and land grading to eliminate depressions that pond.

This soil is generally not used for residential or recreational development because of wetness and caving of cutbanks.

This soil is in capability subclass VIw, undrained; IIIw, drained and woodland group 3w.

YaB—Yaupon silty clay loam, 0 to 3 percent slopes. This soil consists of somewhat poorly drained to moderately well drained, clayey soil. It is near the edges of the mainland and Cape Fear River. Small areas of this soil are cone-shaped, and large areas are irregularly shaped and have dikes 5 to 20 feet high surrounding the areas (fig. 15). The diked areas have strongly sloping

edges. Most areas of this soil range from 10 to 200 acres. The area of this soil on Eagle Island is about 1,000 acres.

Typically, the surface layer is dark gray silty clay loam 7 inches thick. The underlying material to a depth of 85 inches is dark gray silty clay in the upper part, dark greenish gray silty clay in the middle part, and black fine sandy loam in the lower part.

Surface runoff is slow. Permeability is slow or very slow, and the available water capacity is moderate. This soil has high shrink-swell potential that produces wide, deep cracks during the dry season. The soil ranges from very strongly acid to medium acid in the surface and subsurface layers. It ranges from very strongly acid to moderately alkaline in the underlying material. The seasonal high water table is about 2 to 4 feet below the surface.

Included with this soil in mapping are areas of Bohicket and Newhan soils located near the edges of the map unit. The included soils make up about 20 percent of this map unit.

The Yaupon soil is either recent deposits not yet vegetated or older established areas covered with loblolly pine, yaupon holly, live oak, black cherry, southern redcedar, and myrtle oak. The understory consists of gallberry, bermudagrass, poison-ivy, sumac, and greenbrier. Deer, raccoons, cottontail rabbit, eastern brown pelican, and bobwhite quail occasionally use areas of this soil as habitat.

This soil is generally not used for forestry, agricultural, residential, or recreational uses because of high shrink-swell potential, slow or very slow permeability, and wetness.

This soil is in capability subclass IVe and woodland group 3w.

Figure 15.—Yaupon silty clay loam, 0 to 3 percent slopes, surrounded by a dike of Newhan fine sand, dredged, 2 to 30 percent slopes, adjoining the Intracoastal Waterway.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Brunswick County are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in providing the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

About 75,598 acres, or about 14 percent of Brunswick County, meets the soil requirements for prime farmland. This farmland is mainly in the south-central, western, and north-eastern parts of the county. Map units 2 and 5 on the general soil map contain a significant acreage of these soils. The main crops are corn, soybeans, and tobacco.

The map units, or soils, that make up prime farmland in Brunswick County are listed in this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps in the back of the publication. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units."

The soils identified as prime farmland are:

Fo	Foreston loamy fine sand
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes
Jo	Johns fine sandy loam
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes
On	Onslow fine sandy loam

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in Brunswick County. It can be used to adjust land uses to the limitations and suitabilities of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand, roadfill, and topsoil. They can use it to identify areas where wetness or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Maynard H. Owens, district conservationist and Foy D. Hendrix, conservation agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the North Carolina Agricultural Extension Service.

Brunswick County has approximately 50,000 acres of cropland and 4,099 acres of pasture and hayland *(7)*. Corn is grown on 14,000 acres, soybeans on 15,700 acres, tobacco on 1,850 acres, small grains on 820 acres, and sweet potatoes on 480 acres *(8)*. A large percentage of the acreage planted to small grains is double cropped in soybeans.

Control of water and wind erosion is needed on most of the cultivated soils in Brunswick County. Water erosion is a problem on the gently sloping Norfolk soils and the sloping to strongly sloping Marvyn soils. Conservation tillage and field borders are the most cost effective and commonly used conservation practices. Diversions, grassed waterways, cover crops, and crop residue are also important conservation practices (fig. 16). A combination of these practices is generally needed to control water erosion if tobacco, corn, or soybeans is grown. Wind erosion is a problem for droughty, sandy soils where vegetation is sparse or land is cleared. Large fields are subject to soil blowing. Sand blown by strong winds can damage young crops and fill drainage ditches. Maintaining ground cover, establishing windbreaks, and using conservation tillage minimizes soil blowing. Reducing erosion improves crop production and water quality and lowers the loss of nutrients, herbicides, and pesticides.

In Brunswick County, wetness is a problem on about 60 percent of the acreage used for farming. It can be minimized by surface and subsurface drainage. The drainage system can include land grading or surface shaping, open ditches, and tile. The moderately well drained, nearly level Goldsboro and Foreston soils need only moderate artificial drainage. The somewhat poorly drained, poorly drained, and very poorly drained soils need more extensive drainage systems that can include a combination of land grading, open ditches, and tile. These are Lynchburg, Pantego, Rains, Torhunta, and Woodington soils.

Figure 16.—A grassed waterway of lovegrass and tall fescue on Baymeade and Marvyn soils, 6 to 12 percent slopes.

Surface drainage ranges from large, open ditches to small, shallow furrows. The open ditches commonly provide outlets for surface and subsurface drainage. The design of drainage systems varies with the kind of soil. Open ditches on the Torhunta, Woodington, Leon, Murville, Lumbee, Johns, and Pactolus soils are susceptible to caving and filling. Sloping the ditchbanks and seeding with permanent grass will help stabilize the banks. Frequent cleanout of ditches may be necessary to maintain adequate depth.

Parallel ditches are used to drain cropland in broad, flat areas where the soils have a very slow runoff and frequently have ponded water on the surface. These soils are the Croatan, Murville, Pantego, and Torhunta soils. The ditches are spaced between 200 and 400 feet apart. The area between the ditches is crowned in the middle to facilitate surface runoff. Water furrows, or hoedrains, are used to carry the surface water to the parallel ditches. Where these furrows outlet into the open ditches, drop structures are generally needed to prevent erosion of the ditchbank. Grading and seeding the ditchbank is also effective in reducing erosion.

Subsurface drainage typically involves buried tile systems that tie into open ditches. Tile lines are placed

at predetermined intervals to draw off excess subsurface water.

Soil fertility. None of the soils in Brunswick County has enough natural fertility to produce economic returns on crops. They are naturally acid and require additions of lime to make them more productive for crops.

The acidity level in the soil affects the availability of many nutrient elements and activity of beneficial bacteria. Lime decreases acidity and provides calcium (Ca), and when dolomitic lime is used, it also provides magnesium (Mg). The addition of lime neutralizes exchangeable aluminum (Al) and thereby counteracts the adverse effects aluminum has on many important crops grown in the county. Liming is one of the main concerns of farmers.

Liming requirement recommendations are based on soil test determinations. In soils that have a sandy surface layer, it is important to recognize that not only available calcium levels may be low but also magnesium. A soil test will determine liming material needed. Also, the desired soil acidity levels (pH) differ depending upon the soil properties and the crop to be grown, which is considered in the recommendations available through soil testing.

Nitrogen is required for all crops, except peanuts, clovers, and in some rotations of soybeans. No soil test is available for predicting nitrogen requirements. Appropriate rates are discussed in the yields per acre section under a description of good management practices. Because nitrogen can be readily leached from sandy soils, it may be necessary to apply nitrogen on these soils more than once during the growing season.

The need for potassium (K) and phosphorus (P) fertilizers can be predicted from soil tests. It is necessary to determine potassium and phosphate requirements for specific crops by sampling each field and obtaining the soil test recommendations. In Brunswick County it is particularly important to have a soil test of each field to determine phosphorus and potassium requirements because past fertilizer applications tend to build up the nutrients in the soil.

Control of weeds. The use of herbicides for weed control in crops is a common practice in Brunswick County. Successful use results in less tillage and is an integral part of modern farming. Selected soil properties such as organic matter content and texture of the surface layer affect the rate of herbicide application. Estimates for both of these properties were determined for the soils described in this survey. Table 17 shows a general range of organic matter content. The surface texture is shown in table 16 in the USDA texture column.

In some cases, the organic matter content projected for the different soils may range outside that shown in the table. Higher ranges may occur in soil areas that have received high amounts of animal or manmade waste. Soil areas currently being brought into cultivation may have higher levels of organic matter content in their surface layer than similar soil areas that have been in cultivation for a long time. Conservation tillage may also increase organic matter content in the surface layer. Lower levels of organic matter are common in areas where the surface layer has been partly or completely removed by erosion, land smoothing, or other activities. There may also be other activities that affect organic matter content for a given soil. Current soil tests should be used for specific organic matter determinations.

Rapid leaching of herbicides may damage young plants or prevent normal seed germination in sandy soils with less than 2 percent organic matter. The effectiveness of herbicides commonly decreases as organic matter levels increase.

For specific herbicide rates based on organic matter content and surface texture, read the label.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the North Carolina Agricultural Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land Capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and map unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, or s,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow, or droughty.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w* or *s,* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

Capability map units are soil groups within a subclass. The soils in a capability map unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability map units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Maynard H. Owens, district conservationist, and E.J. Young, forester, Soil Conservation Service, helped prepare this section.

Forest lands are of economic, social, recreational, and environmental importance to Brunswick County. Wooded areas have aesthetic value and provide habitat for wildlife. Commercial forests cover about 430,862 acres of the land area *(11)*. Continuing urban encroachment, clearing for cropland, and other forest withdrawals continue to reduce the commercial forest acreage. Commercial forest land is defined as land capable of producing crops of industrial wood and not withdrawn from timber utilization.

Approximately 250,000 acres of woodland in Brunswick County are intensively managed commercial forests. Management practices include artificial drainage, bedding, controlled burning, selective harvesting, and tree planting. To prevent understory hardwoods from becoming dominant and taking over sites of harvested stands of pine, controlled burning and mechanical site preparation are used. To facilitate reestablishment of pines, drainage and bedding are needed on the wet sites. Loblolly pine, adapted to the soil and climate, is an important timber species in the county. It is relatively easy to establish and manage on a wide variety of soils and brings the highest average sale value per acre.

Five forest types have been identified in the county *(13)*:

Loblolly (255,124 acres). This type is made up of more than 50 percent of this pine species. It includes pond pine, red and white oaks, sweetgum, blackgum, hickory, and yellow-poplar. The major soils are Lynchburg, Rains, Goldsboro, Woodington, Foreston, and Norfolk soils.

Longleaf-Slash (66,394 acres). Longleaf or slash pine, singly or in combination, make up more than 50 percent of this forest type. Common associates include oak, hickory, and blackgum. The major soils are Kureb, Wando, Pactolus, Mandarin, Tomahawk, and Leon soils.

Oak-Pine (38,867 acres). Hardwoods make up more than 50 percent of the stand, but pines commonly make up 20 to 50 percent in association with upland oaks, sweetgum, blackgum, hickory, and yellow-poplar. This forest type, if left undisturbed, will develop into a forest of predominantly oak and other upland hardwoods. The

understory in both the loblolly pine and oak-pine types usually consists of hardwood seedlings and saplings because they are more tolerant of shade than pine seedlings are. Hardwoods compete so strongly with pine reproduction for light and moisture in a shaded understory that few pine seedlings are able to survive. When mature stands of pine are harvested, the dense understory of young hardwoods becomes dominant. The major soils are Baymeade, Blanton, Norfolk, Foreston, Marvyn, and Johns soils.

Oak-Gum-Cypress (66,525 acres). In this forest type tupelo, blackgum, sweetgum, oaks, Atlantic white-cedar, or southern cypress, singly or in combination, make up more than 50 percent of the stocking, except where pines make up 25 to 50 percent, in which case the stand would be classified oak-pine. Common associates include red maple, yellow-poplar, pond pine, ash, elm, and hackberry. The major soils are Torhunta, Pantego, Croatan, Chowan, Dorovan, and Muckalee soils.

Elm-Ash-Cottonwood (3,952 acres). In this forest type elm, ash, or cottonwood, singly or in combination, make up more than 50 percent of the stocking. Common associates include willow, sycamore, beech, and maple. The major soils are Chowan, Dorovan, and Muckalee soils.

Site index is a measure of soil productivity and its capability to grow trees. Loblolly pine is used as a key indicator species for determining site index for most soils in the county, except on sites more suitable for hardwoods. Site index values assigned to each species are shown in table 8. Yield tables for various tree species show the potential growth or yield by site index *(11)*. For example, table 9 shows the potential loblolly pine yearly growth or yield per acre in board feet. It shows the range of timber growth or yield as it relates to soil productivity.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates excessive water in or on the soil and *s*, sandy texture. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: w and s.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings for the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings for *equipment limitations* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

Maynard H. Owens, district conservationist, assisted with this section.

Recreation is a major part of the economy of Brunswick County. It is important in all sections of the county, but it is of major importance on the Outer Banks and adjacent mainland areas.

The beaches of the Outer Banks are a unique resource for recreation. The beaches face the south and are excellent for swimming and other water sports. Vacation cottages, golf courses, and camping sites are common in dune areas. Soil blowing can be a serious problem for droughty, sandy soils. Breaks in foredunes and blowouts can form where vegetation is disturbed. Maintaining or reestablishing vegetation helps to minimize these problems.

Between the Outer Banks and the mainland, the Intracoastal Waterway provides a source of boating,

fishing, waterskiing, and shellfishing. Bald Head Island is a unique part of the Outer Banks. It is a subtropical island within a temperate climate zone and contains a wide variety of plants and animals. Also, the island has a golf course and vacation homes *(4)*.

The mainland areas near the Intracoastal Waterway are also a significant part of the recreation of Brunswick County. Many vacation cottages, golf courses, and riding stables are located here. The Boiling Spring Lakes area has numerous lakes and ponds used for boating, swimming, waterskiing, and fishing.

Game animals are abundant in the Green Swamp, especially deer and bear, making this area an important place for hunting. Also, biologists find the Nature Conservancy Purchase Area, contained within the Green Swamp, an interesting place to study natural plant and animal life.

Other areas in the county that provide recreation are the various streams and rivers, particularly the Cape Fear River, the Waccamaw River, and Town Creek. They provide places for fishing and boating, as well as being naturally scenic areas.

The county has a number of historical sites. These include Orton Plantation; Old Brunswick Town; Forts Anderson, Johnson, and Caswell; and the St. Phillips Episcopal Church ruins.

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is also considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 10, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Maynard H. Owens, district conservationist, and John P. Edwards, biologist, Soil Conservation Service, helped prepare this section.

Populations of songbirds and small game are plentiful throughout Brunswick County. Abundant small game species include cottontail rabbit, raccoons, and opposum. Red fox, grey fox, and beaver thrive in some areas. White-tailed deer is the only big game species that has a significant and widespread population. Black bear is common in a few localized areas. Waterfowl populations are varied and extensive in the coastal marshlands. Loggerhead turtles frequent and thrive along the ocean shoreline.

Wildlife is related to soils through an indirect relationship with plants. Wildlife species are associated with types of plant communities, which, in turn, are directly related to particular kinds of soils. Proper

management of soil, water, and plants to produce suitable habitat effectively maintains and improves wildlife populations.

The wildlife habitat in Brunswick County is highly varied *(9)*. It varies primarily because of the different types of landforms and land uses.

Small farms, with intermingled cropland and woodland, are scattered throughout the county, except in the Green Swamp area. The edges of the fields provide excellent habitat. In addition, there are numerous ditches bordered by trees and shrubs, and there are many abandoned fields. These areas provide excellent habitat for upland wildlife species.

Green Swamp is characterized by large woodland tracts that have few or no houses or farmsteads. The roads and road ditches throughout this area provide both water and browsing habitat. Deer, as well as small game and birds, are very abundant. Black bear inhabit this area. The main soils in the Green Swamp area are Croatan, Torhunta, Woodington, Pantego, and Rains soils. Nature Conservancy Purchase Area is a portion of the Green Swamp area. This is composed of 13,850 acres and is owned by the state. It will be managed and maintained in its natural condition. The main soils in this area are Croatan and Torhunta soils.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, millet, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, switchgrass, bahiagrass, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are goldenrod and beggarweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, sweetgum, dogwood, hickory, blackberry, blueberry, sweetbay, redbay, and titi. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, and salinity. Examples of wetland plants are smartweed, wild millet, saltgrass, cordgrass, rushes, sedges, reeds, cutgrass, and cattail.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are wetness, slope, and permeability.

Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs:

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas includes bobwhite quail, mourning dove, cottontail rabbit, red fox, and many species of songbirds.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include thrushes, woodpeckers, squirrels, gray fox, raccoons, opossum, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy, shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

The waters in and around the Intracoastal Waterway are excellent habitat for waterfowl. Large numbers of migrating waterfowl overwinter. Large flocks of scoters, loons, redbreasted mergansers, and other waterfowl use these areas in the fall and spring. The sandy beaches are breeding sites for the loggerhead sea turtle. It is also a resting and feeding area for a variety of birds such as gulls, terns, pelicans, and many other species. Animals such as feral hogs, raccoons, and gray fox, as well as boattailed grackles, redwings, and other songbirds make regular visits. The main soil is Newhan soil. The thickets and maritime forest are habitats for cottontail rabbit and cotton rat, raccoons, opossum, otter, and mink, and many birds, such as several species of warblers, catbirds, towhees, and blue jays. The main soils are Corolla and Duckston soils. The salt water marshes and tidal creeks are feeding areas for many animal and bird species. These areas are especially valuable as nursery and habitat for fish and shellfish. The main soils are Bohicket, Carteret, Chowan, and Lafitte soils.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals and mineralogy of the sand and silt fractions. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreation uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the

indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open-ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by soil texture and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to a cemented pan, a high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials in marsh areas affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 13 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 13 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to a cemented pan, and flooding affect absorption of the effluent. A cemented pan also interferes with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 13 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1

or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to a cemented pan, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and cemented pans can cause construction problems.

Sanitary landfills are areas where solid waste is disposed by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over a cemented pan or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 14 gives information about the soils as a source of roadfill, sand, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand. They have at least 5 feet of suitable material, low shrink-swell potential, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand is a natural aggregate suitable for commercial use with a minimum of processing. Sand is used in many kinds of construction. Specifications for each use vary widely. In table 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand are gradation of grain sizes (as indicated by the engineering classification of the soil), and the thickness

of suitable material. Acidity and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand that is up to 12 percent silty fines. This material must be at least 3 feet thick. All other soils are rated as an improbable source.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, or soils that have only 20 to 40 inches of suitable material. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper, onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to a cemented pan or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by depth to a cemented pan, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by the depth to a cemented pan. The performance of a system is affected by the depth of the root zone, suitable irrigation water, and soil reaction.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity.

Wetness, slope, and depth to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and slow or restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 19.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam,' for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 19.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to absorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per map unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more that 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. For mineral horizons, soil reaction was determined by Helig-Truog. For organic materials, soil reaction was determined in a mixture of soil and 1:2 0.01M calcium chloride. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value the

more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is standing water in swamps and marshes.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 18 are the depth to the seasonal high water table; the kind of water table that is, *perched* or *apparent;* and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 18.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. The first numeral in the range indicates how high the water rises. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The second numeral indicates the maximum depth of the water table below the surface.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 16 shows the expected initial subsidence, which usually is a result of drainage, and annual subsidence, which usually is a result of oxidation.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to factors such as soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 19 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the State of North Carolina, Department of Transportation and Highway Safety, Materials and Tests Unit.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145-173 (AASHTO), Mechanical analysis—T 88 (AASHTO); Liquid limit—T 89 (AASHTO); Plasticity index—T 90 (AASHTO); Moisture density, Method A—T 99-74 (AASHTO).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(14)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udults (*Ud*, meaning of humid climate, plus *ult*, from Ultisols).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Paleudults (*Pale*, meaning an old, well developed soil, plus *Udults*, the suborder of the Ultisols that occur in humid climate).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aquic* identifies the subgroup that typifies the great group. An example is Aquic Paleudults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, siliceous, thermic Aquic Paleudults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetical order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, or small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual *(12)*. Many of the technical terms used in the descriptions are defined in Soil Taxonomy *(14)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Baymeade Series

The Baymeade series consists of well drained soils on uplands. The soils formed in moderately coarse textured sediment. Slopes range from 1 to 12 percent.

Typical pedon of Baymeade fine sand, 1 to 6 percent slopes, 1.8 miles northeast of Sunny Point Terminal on the main access road, 0.4 mile south of intersection of main access road and woods road, 10 feet east of woods road:

A—0 to 3 inches; dark gray (10YR 4/1) fine sand; single grained; loose; common fine and medium roots; many uncoated sand grains; strongly acid; clear wavy boundary.

E—3 to 9 inches; light gray (10YR 7/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; clear wavy boundary.
E/Bh—9 to 23 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few irregular bodies of friable organic-coated sand that are dark reddish brown (5YR 3/2) and brownish yellow (10YR 6/8); about 15 percent Bh bodies 1/8 to 1/4 inch in diameter; common medium brittle yellowish red (5YR 4/6) mottles; few fine roots; strongly acid; clear wavy boundary.
Bt1—23 to 42 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.
Bt2—42 to 54 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.
BC—54 to 62 inches; light yellowish brown (10YR 6/4) loamy fine sand; common medium distinct strong brown (7.5YR 5/8) and light gray (10YR 7/1) mottles; weak fine subangular blocky structure; very friable; strongly acid; gradual wavy boundary.
C—62 to 80 inches; very pale brown (10YR 7/4) fine sand with strata of gray (10YR 6/1) and brownish yellow (10YR 6/6) sandy clay loam; single grained; loose; strongly acid.

The sandy A and E horizons are more than 20 inches thick over a loamy Bt horizon that ranges from 15 to 40 inches thick. The soil is very strongly acid or strongly acid, except in areas that have been limed.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 4 to 8, and chroma of 1 to 4. The Bh part of the E/Bh horizon constitutes 5 to 20 percent of this horizon and has hue of 5YR to 10YR, value of 3 to 7, and chroma of 2 to 8. It is fine sand or loamy fine sand.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. Texture is fine sandy loam or sandy clay loam. The Bt2 horizon may occur as lamellae of fine sandy loam or sandy clay loam.

The BC horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 8. Mottles are in shades of yellow, brown, or gray. Texture is loamy sand, loamy fine sand, or sandy clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 6 to 8, and chroma of 1 to 8. Texture ranges from fine sand to clay, or this horizon is stratified in these textures.

Blanton Series

The Blanton series consists of moderately well drained soils on uplands. The soils formed in moderately fine textured sediment. Slopes range from 0 to 5 percent.

Typical pedon of Blanton fine sand, 0 to 5 percent slopes, 0.9 mile northwest of the intersection of N.C. Highway 211 and U.S. Highway 17, 1 mile northeast of the intersection of State Road 1342 and State Road 1344, and 1 mile southwest of the intersection of N.C. Highway 211 and State Road 1343, in woods:

A—0 to 5 inches; gray (10YR 5/1) fine sand; single grained; loose; many fine and common medium roots; very strongly acid; abrupt smooth boundary.
E—5 to 14 inches; light gray (10YR 7/1) fine sand; single grained; loose; very strongly acid; gradual wavy boundary.
E/Bh—14 to 28 inches; yellowish brown (10YR 5/4) fine sand; 15 percent weakly to strongly cemented dark reddish brown (5YR 3/3) irregular bodies of friable organic-coated sand; single grained; loose; very strongly acid; gradual wavy boundary.
E'—28 to 48 inches; light yellowish brown (2.5Y 6/4) fine sand; single grained; loose; very strongly acid; gradual wavy boundary.
Bt1—48 to 63 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.
Bt2—63 to 80 inches; yellowish brown (10YR 5/6) sandy loam; common medium distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; very friable; very strongly acid.

The sandy A and E horizons are more than 40 inches thick over a loamy B horizon. The soil is very strongly acid or strongly acid, unless the surface layer has been limed.

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 8. The E horizon is fine sand or sand. The Bh part of the E/Bh horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4.

The E' horizon, where present, has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 to 8. It is sand or fine sand.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 to 8, and chroma of 1 to 8. The lower part of the Bt horizon has mottles in chroma of 2 or less. The Bt horizon is sandy loam or sandy clay loam.

The Blanton soil, as mapped in this county, has an intermittent spodic horizon in the upper part of the soil profile. On this basis it is considered a taxadjunct to the Blanton series. There is no difference in use and management or behavior between this taxadjunct and the Blanton series.

Bohicket Series

The Bohicket series consists of very poorly drained soils in coastal marshes. The tidal flats range from 0 to 3 feet above sea level. The soils formed in medium and fine textured sediment. Slopes are less than 1 percent.

Typical pedon of Bohicket silty clay loam, 250 feet south of the end of Oak Island Bridge, 50 feet east of the bridge, in a marsh:

A—0 to 15 inches; dark gray (5Y 4/1) silty clay loam; massive; sticky, slightly viscous, soil flows easily between fingers when squeezed; many very fine roots and common coarse cordgrass stems; moderately alkaline; gradual wavy boundary.

Cg1—15 to 25 inches; dark gray (5Y 4/1) silty clay; massive; sticky, slightly viscous, soil flows easily between fingers when squeezed; common very fine roots and few coarse cordgrass stems; moderately alkaline; gradual wavy boundary.

Cg2—25 to 70 inches; dark gray (5Y 4/1) silty clay; massive; sticky, slightly viscous, soil flows easily between fingers when squeezed; moderately alkaline.

The Bohicket soils are continuously saturated with water. They have *n* values of 1 or more in all horizons between 10 and 40 inches. Soil salinity is only moderate despite the coastal location because of the flushing effect of freshwater streams. The soil is neutral to moderately alkaline throughout. After air drying for 30 days, it is extremely acid.

The A horizon has hue of 10YR to 5G, value of 3 or 4, and chroma of 1 or 2.

The Cg horizon has hue of 5Y or 5GY, or it is neutral, and has value of 3 to 5 and chroma of 2 or less. The upper part is silty clay or clay. Some pedons have thin strata or pockets of sand, sandy loam, or sandy clay loam. The lower part of the Cg horizon is variable, ranging from sand to clay.

The Bohicket soil as mapped in this county is moderately saline. On this basis it is considered a taxadjunct to the Bohicket series. There is no difference in use and management or behavior between this taxadjunct and the Bohicket series.

Bragg Series

The Bragg series consists of well drained, modified soil material. The soils formed from cutting and filling construction operations in loamy soils. Slopes range from 2 to 6 percent.

Typical pedon of Bragg fine sandy loam, 2 to 6 percent slopes, 0.9 mile northeast of Bishop, 0.4 mile southwest of intersection of State Road 1414 and U.S. Highway 17, 200 feet south of U.S. Highway 17:

Ap—0 to 10 inches; dark gray (10YR 4/1) fine sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; massive; very friable; very strongly acid; gradual irregular boundary.

C1—10 to 36 inches; dark grayish brown (10YR 4/2) sandy clay loam that has pockets of fine sandy loam; few medium distinct brownish yellow (10YR 6/6) and light gray (10YR 7/2) mottles; massive; friable, slightly sticky and slightly plastic; medium acid; clear irregular boundary.

C2—36 to 63 inches; grayish brown (10YR 5/2) fine sandy loam; common medium distinct light gray (10YR 7/2) mottles; massive; friable, slightly sticky and slightly plastic; medium acid; clear irregular boundary.

C3—63 to 70 inches; dark gray (5Y 4/1) sandy clay loam; few medium distinct brownish yellow (10YR 6/6) and light gray (10YR 7/1) mottles; massive; friable, slightly sticky and slightly plastic; neutral; clear irregular boundary.

Ab—70 to 75 inches; very pale brown (10YR 7/3) loamy fine sand; few medium distinct light yellowish brown (10YR 6/4) mottles; massive; very friable; medium acid.

The loamy horizons of fill material range from 20 inches to more than 80 inches. The surfaces are very strongly acid or strongly acid, except in areas that have been limed. The underlying materials range from very strongly acid to neutral.

The Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 6.

The upper part of the C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 to 8. Texture is dominantly fine sandy loam, sandy loam, or sandy clay loam. Some pedons have thin horizons that are clay loam or sandy clay. The lower part of the C horizon is variable in color and texture.

The Ab horizon, where present, has hue of 10YR, value of 2 to 7, and chroma of 0 to 4. It is loamy fine sand or sand.

The Bragg soil as mapped in this county is slightly higher in reaction than the Bragg series. On this basis it is considered a taxadjunct to the Bragg series. There is no difference in use and management or behavior between this taxadjunct and the Bragg series.

Carteret Series

The Carteret series consists of very poorly drained soils in coastal marshes. The tidal flats range from 1 to 3 feet above sea level. The soils formed in coarse textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Carteret loamy fine sand, on the west end of Holden Beach, 3.2 miles west of intersection of Ocean Drive and N.C. Highway 130, 250 feet north of Ocean Drive:

A—0 to 9 inches; dark greenish gray (5GY 4/1) loamy fine sand; weak medium granular structure; very friable; many fine roots; common strong brown and dark gray mineral grains; moderately alkaline; clear smooth boundary.
Cg1—9 to 50 inches; greenish gray (5GY 5/1) fine sand; single grained; loose; few fine shell fragments; common strong brown and dark gray mineral grains; moderately alkaline; clear wavy boundary.
Cg2—50 to 72 inches; dark greenish gray (5GY 4/1) fine sand; single grained; loose; few fine shell fragments; common streaks of dark mineral grains; moderately alkaline.

The sandy horizons are 72 inches thick or more. The soil is mildly alkaline or moderately alkaline throughout. Few to common shell fragments are present throughout.

The A horizon has hue of 5GY, value of 3 or 4, and chroma of 1 or 2.

The Cg horizon has hue of 5GY, value of 4 or 5, and chroma of 1. Texture is loamy sand, fine sand, or sand. Some pedons have thin, intermittent layers of clay loam and silty clay loam.

Chowan Series

The Chowan series consists of poorly drained soils on flood plains. The soils formed from silty fluvial sediment deposited over organic material. Slopes are 0 to 2 percent.

Typical pedon of Chowan silt loam, 5.5 miles north of Maco, 4 miles northeast of the community of North West, 5.8 miles northwest of Phoenix, 0.5 mile north of the intersection of State Road 1422 and a woods road:

A—0 to 4 inches; dark grayish brown (2.5Y 4/2) silt loam; massive; friable; few medium roots; very strongly acid; gradual wavy boundary.
Cg1—4 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam; massive; friable, sticky and plastic; few large roots; strongly acid; gradual wavy boundary.
Cg2—25 to 34 inches; black (10YR 2/1) mucky silt loam; massive; friable, slightly sticky and slightly plastic; few large roots; medium acid; gradual wavy boundary.
2Oa1—34 to 52 inches; very dark grayish brown (10YR 3/2) muck; about 40 percent fibers, less than 15 percent rubbed; massive; very friable; few woody roots; very strongly acid; gradual wavy boundary.
2Oa2—52 to 80 inches; dark brown (7.5YR 3/2) muck; about 50 percent fibers, less than 15 percent rubbed; massive; very friable; common logs and roots; very strongly acid.

The loamy mineral surface horizon ranges from 16 to 40 inches thick over highly decomposed organic material. The soil ranges from extremely acid to medium acid in the mineral horizon and is extremely acid or very strongly acid in the organic horizon.

The A horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. A horizons that have value less than 3.5 are less than 10 inches thick.

The Cg horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. Texture is loam, silt loam, silty clay loam, or mucky silt loam.

The 2Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3. It is sapric material. Stumps, logs, and large roots are common throughout the Oa horizon of some pedons.

Corolla Series

The Corolla series consists of moderately well drained and somewhat poorly drained soils on the Outer Banks. The soils formed in coarse textured eolian and marine sediments. Slopes are 0 to 2 percent.

Typical pedon of Corolla fine sand, at Ocean Isle, 0.3 mile north of the intersection of State Road 1207 and State Road 1144, 50 feet east of State Road 1207:

A—0 to 1 inch; grayish brown (10YR 5/2) fine sand; single grained; loose; mildly alkaline; gradual wavy boundary.
C—1 to 15 inches; very pale brown (10YR 7/3) fine sand; few medium distinct strong brown (7.5YR 5/8) mottles; single grained; loose; few small shell fragments; mildly alkaline; gradual wavy boundary.
Cg1—15 to 42 inches; light brownish gray (2.5Y 6/2) fine sand; single grained; loose; few dark mineral grains; few small shell fragments; mildly alkaline; gradual wavy boundary.
Cg2—42 to 80 inches; light olive gray (5Y 6/2) fine sand; single grained; loose; mildly alkaline.

The sandy horizons are more than 72 inches thick. The soil ranges from medium acid to mildly alkaline throughout. The silt plus clay is less than 5 percent. Small calcareous shell fragments are present in most pedons. The soil contains few to many dark minerals.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 or 4. High chroma mottles are few to common in most pedons.

The Cg horizon below a depth of 15 inches has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. Texture is fine sand or sand.

Croatan Series

The Croatan series consists of very poorly drained organic soils on uplands. The soils formed from herbaceous plant residue deposited over loamy mineral sediment. Slopes are 0 to 2 percent.

Typical pedon of Croatan muck, 9.6 miles north of Supply, 4.3 miles southeast of Honey Island, 100 feet south-southeast of the intersection of Jerry Dowless Road and Lattie Loop Road:

Oa1—0 to 8 inches; black (10YR 2/1) muck; about 3 percent unrubbed fibers and 1 percent rubbed fibers; weak fine granular structure; very friable; common fine and medium roots; few grains of clean sand; about 30 percent mineral content; very strongly acid; gradual wavy boundary.
Oa2—8 to 39 inches; black (10YR 2/1) muck; about 3 percent unrubbed fibers and 1 percent rubbed fibers; massive; very friable; few fine and medium roots; few grains of clean sand; about 30 percent mineral content; extremely acid; gradual wavy boundary.
2Ab—39 to 45 inches; dark brown (7.5YR 3/2) mucky sandy loam; massive; very friable; about 85 percent mineral content; extremely acid; gradual wavy boundary.
2Cg1—45 to 63 inches; mottled brown (10YR 5/3) and dark grayish brown (10YR 4/2) sandy loam; massive; friable; extremely acid; gradual wavy boundary.
2Cg2—63 to 80 inches; dark gray (5YR 4/1) sandy clay loam that has thin strata of light gray (10YR 6/1) sandy loam; massive; friable; extremely acid.

The organic horizons range from 16 to 51 inches thick. They are extremely acid unless the surface layer has been limed. The underlying mineral horizons range from extremely acid to slightly acid. In undeveloped areas, 0 to 10 percent of the organic horizons is logs, stumps, and fragments of wood. Some pedons have charcoal particles and pockets of ash.

The organic horizons have hue of 7.5YR to 5Y, or they are neutral, and have value of 2 or 3, and chroma of 0 to 2. Fiber content of the organic horizons is 3 to 25 percent unrubbed and less than 10 percent after rubbing. They are typically massive under natural wet conditions. Upon drainage and cultivation, a granular or blocky structure develops in all or part of the organic horizons, depending upon the nature and depth of the organic material as well as duration of drainage.

The underlying mineral horizons have hue of 5YR to 5Y, value of 2 to 6, and chroma of 1 to 3. Texture is loamy in the upper part of the mineral layers and ranges from sand to clay in the lower layers.

Dorovan Series

The Dorovan series consists of very poorly drained organic soils on low flood plains of fresh water streams. The soils formed from plant residue deposited over sandy mineral sediment. Slopes are less than 1 percent.

Typical pedon of Dorovan muck, 2.6 miles south of Supply, 1 mile southwest of the intersection of N.C. Highway 211 and State Road 1178, 0.4 mile south of the intersection of State Road 1178 and farm road, 25 feet east of farm road:

Oa1—0 to 8 inches; black (10YR 2/1) muck; 20 percent fiber, about 5 percent rubbed; massive; slightly sticky; many medium and fine roots; about 20 percent silt and fine sand; extremely acid; gradual wavy boundary.
Oa2—8 to 20 inches; black (10YR 2/1) muck; 15 percent fiber, about 3 percent rubbed; massive; nonsticky; common fine roots; about 15 percent silt and fine sand; extremely acid; clear smooth boundary.
Oa3—20 to 95 inches; black (N 2/0) muck; 15 percent fiber, about 6 percent rubbed; massive; nonsticky; 30 percent mineral content; extremely acid; clear smooth boundary.
Oa4—95 to 99 inches; black (10YR 2/1) muck; 15 percent fiber, 15 percent fiber rubbed; massive; thin beds of light gray (10YR 7/1) sand; extremely acid.

The decomposed organic layers range from 51 to more than 80 inches thick. The soil is extremely acid in the organic layers.

The organic layers have hue of 10YR, or they are neutral, and have value of 2 to 4, chroma of 1 or 2, and few to common clean sand grains.

The underlying mineral soils range from sand to sandy loam.

Duckston Series

The Duckston series consists of poorly drained soils on the Outer Banks. The soils formed in coarse textured eolian and marine sediments. Slopes are 0 to 2 percent.

Typical pedon of Duckston fine sand, at Holden Beach, 2.5 miles west of N.C. Highway 130, 0.1 mile north of the intersection of Ocean Road and Sand Dollar Road, 0.2 mile south of the Intracoastal Waterway:

A1—0 to 4 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; mildly alkaline; clear wavy boundary.
A2—4 to 8 inches; dark gray (5Y 4/1) fine sand; massive; friable; mildly alkaline; clear wavy boundary.
Cg1—8 to 18 inches; light brownish gray (10YR 6/2) fine sand; few coarse distinct yellowish red (5YR 5/6) mottles; single grained; loose; moderately alkaline; gradual wavy boundary.
Cg2—18 to 80 inches; dark gray (5Y 4/1) fine sand; few coarse distinct dark yellowish brown (10YR 4/4) mottles; single grained; loose; moderately alkaline.

The sandy horizons are more than 72 inches thick. The soil is neutral to moderately alkaline throughout. The silt plus clay is less than 5 percent. Small calcareous

shell fragments are present in most pedons. The soil contains few to many dark minerals.

The A horizon has hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or 2.

The Cg horizon has hue of 10YR to 5GY, value of 4 to 7, and chroma of 0 or 2. Mottles are in shades of brown. Texture is fine sand, sand, or loamy sand.

Foreston Series

The Foreston series consists of moderately well drained soils on uplands. The soils formed in moderately coarse textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Foreston loamy fine sand, 0.1 mile west of the intersection of State Road 1415 and State Road 1438, 0.1 mile north of State Road 1415, and 50 feet west of railroad:

A—0 to 4 inches; dark gray (10YR 4/1) loamy fine sand; weak medium granular structure; very friable; common fine roots; strongly acid; clear wavy boundary.

E—4 to 12 inches; yellowish brown (10YR 5/4) loamy fine sand; weak medium granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

Bt1—12 to 26 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Bt2—26 to 40 inches; yellowish brown (10YR 5/6) fine sandy loam; few medium distinct light brownish gray (10YR 6/2) and reddish yellow (7.5YR 6/8) mottles; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Btg—40 to 52 inches; light gray (10YR 7/2) fine sandy loam; common coarse distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

BCg—52 to 78 inches; light gray (10YR 7/1) fine sandy loam that has strata of loamy sand and small pockets of clean sand grains; common coarse distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Cg—78 to 85 inches; light gray (10YR 7/2) loamy sand that has strata of sandy clay loam and sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; massive; very friable; very strongly acid.

The sandy and loamy horizons extend to more than 60 inches. The soil is very strongly acid or strongly acid, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. Texture is loamy fine sand or loamy sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 6. Mottles in shades of gray are within 18 to 30 inches of the surface. The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2. Mottles are in shades of yellow, brown, and red. The Bt and Btg horizons are sandy loam or fine sandy loam.

The BCg and Cg horizons have hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 to 6. These horizons are stratified fine sandy loam, sand, loamy sand, sandy loam, and sandy clay loam.

Goldsboro Series

The Goldsboro series consists of moderately well drained soils on uplands. The soils formed in moderately fine textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Goldsboro fine sandy loam, 0 to 2 percent slopes, 2.5 miles southeast of Waccamaw, 3.25 miles northeast of Longwood, 250 feet east of the intersection of State Road 1323 and North Carolina Highway 130, in an open field:

Ap—0 to 8 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium granular structure; very friable; few fine and medium roots; very strongly acid; abrupt smooth boundary.

Bt1—8 to 20 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium faint strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; very strongly acid; gradual wavy boundary.

Bt2—20 to 32 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium distinct light gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg1—32 to 41 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles and few fine prominent red (10R 4/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—41 to 54 inches; mottled light gray (10YR 7/1), brownish yellow (10YR 6/8), and red (10R 4/8) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg3—54 to 70 inches; light gray (10YR 6/1) sandy clay loam that has thin strata of sandy loam; few fine distinct brownish yellow (10YR 6/8) mottles and few medium prominent red (2.5YR 4/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.
Cg—70 to 80 inches; light gray (10YR 6/1) loamy sand; common medium distinct light yellowish brown (10YR 6/4) mottles; massive; very friable; very strongly acid.

The loamy Bt horizons are more than 40 inches thick over stratified sediment. The soil is very strongly acid or strongly acid, unless the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2.

The E horizon, where present, has hue of 10YR, value of 5 to 7, and chroma of 3 or 4. The E horizon is sandy loam, fine sandy loam, or loamy sand.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6 in the upper part. Gray mottles are within 18 to 30 inches of the surface. The Btg horizon has chroma of 1 or 2 or is mottled in shades of red, yellow, or brown. The Bt and Btg horizons are sandy clay loam or sandy loam in the upper part and sandy clay loam or sandy clay in the lower part.

The BCg horizon, where present, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, yellow, or brown. Texture is sandy loam, sandy clay loam, or loam.

Texture of the Cg horizon ranges from loamy sand to sandy clay.

Grifton Series

The Grifton series consists of poorly drained soils on uplands. The soils formed in moderately fine textured sediment mixed in soft marl. Slopes are 0 to 2 percent.

Typical pedon of Grifton fine sandy loam, 0.5 mile west of Thomasboro, 150 feet north of the intersection of U.S. Highway 17 and Little Caw Caw Canal:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; common fine roots; medium acid; clear wavy boundary.
E—6 to 17 inches; grayish brown (10YR 5/2) fine sandy loam; few fine distinct brownish yellow (l0YR 6/6) mottles; weak medium granular structure; very friable; common fine roots; slightly acid; gradual wavy boundary.
Btg1—17 to 26 inches; light brownish gray (10YR 6/2) sandy clay loam; few pockets of sandy loam; few fine distinct yellow (10YR 7/6) mottles; weak fine subangular blocky structure; very friable; common fine roots; slightly acid; gradual wavy boundary.
Btg2—26 to 33 inches; grayish brown (10YR 5/2) sandy clay loam; few fine distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few patchy clay films on faces of peds; neutral; gradual wavy boundary.
BCg—33 to 60 inches; gray (10YR 6/1) sandy clay loam that has thin lenses of sandy clay; common medium distinct yellowish brown (10YR 5/8) and gray (N 5/0) mottles; weak fine subangular blocky structure; firm, sticky and slightly plastic; moderately alkaline; gradual wavy boundary.
2Cg1—60 to 70 inches; light gray (5Y 6/1) sandy loam that has thin strata of greenish gray (5GY 6/1) clay; massive; friable; moderately alkaline; gradual wavy boundary.
2Cg2—70 to 80 inches; light gray (5Y 6/1) fine sand; single grained; loose; moderately alkaline.

The loamy Bt horizons are 15 to 45 inches thick over sandy or loamy material. Some pedons are over marl, and the transitional horizons are absent. The A and E horizons range from strongly acid to slightly acid, unless the surface layer has been limed. The B and C horizons range from slightly acid to moderately alkaline.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2.

The E horizon, where present, has slightly higher chroma than the A horizon. The texture is fine sandy loam or sandy loam.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Texture is sandy clay loam or sandy loam.

The BCg and Cg horizons are similar in color to the lower Bt horizons. The texture is sand, sandy clay loam, or sandy loam, with thin lenses of sandy clay loam or clay. The lower Bg horizon and Cg horizon contain friable to hard marl fragments and iron and manganese concretions in some pedons.

Johns Series

The Johns series consists of somewhat poorly drained and moderately well drained soils on stream terraces. The soils formed in moderately fine textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Johns fine sandy loam, 0.3 mile southeast of the Waccamaw River Bridge on N.C. Highway 904, 0.45 mile northeast of the intersection of N.C. Highway 904 and forest road, 25 feet east of forest road:

A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

E1—4 to 9 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.
E2—9 to 13 inches; brownish yellow (10YR 6/6) fine sandy loam; weak fine subangular blocky structure; very friable; very strongly acid; clear wavy boundary.
Bt1—13 to 16 inches; yellowish brown (10YR 5/4) sandy clay loam; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.
Bt2—16 to 30 inches; light yellowish brown (10YR 6/4) sandy clay loam; few medium distinct brownish yellow (10YR 6/8) mottles and common medium distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.
BCg—30 to 38 inches; light brownish gray (10YR 6/2) sandy clay loam that has pockets of sandy loam; few medium distinct strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable; very strongly acid; clear wavy boundary.
2Cg1—38 to 46 inches; mottled gray (10YR 6/1), light yellowish brown (10YR 6/4), and brownish yellow (10YR 6/8) loamy sand that has strata of sand; single grained; loose; very strongly acid; gradual wavy boundary.
2Cg2—46 to 70 inches; light gray (10YR 7/2) sand; few medium distinct light yellowish brown (10YR 6/4) mottles; single grained; loose; very strongly acid.

The sandy A and E horizons and loamy Bt horizons have a combined thickness of less than 40 inches over sandy sediment. The soils are very strongly acid or strongly acid throughout, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 7, and chroma of 3 to 6. Texture is loamy sand, sandy loam, or fine sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 8. In some pedons the Bt horizon has few to common mottles in chroma of 2 or less. Texture is sandy clay loam or sandy loam. The BCg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Texture is sandy clay loam or sandy loam. Some pedons of the BCg horizon have thin strata of these textures.

The 2Cg horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Texture is sand or loamy sand.

Kureb Series

The Kureb series consists of excessively drained soils on uplands. The soils formed in coarse textured sediment. Slopes range from 1 to 8 percent.

Typical pedon of Kureb fine sand, 1 to 8 percent slopes, 1.7 miles east of Gause Landing, 1.3 miles east of the intersection of N.C. Highway 904 and State Road 1172, 150 feet south of the intersection of N.C. Highway 904 and State Road 1183:

A—0 to 4 inches; gray (10YR 5/1) fine sand; single grained; loose; common uncoated sand grains; many fine and few coarse roots; slightly acid; clear wavy boundary.
E—4 to 20 inches; light gray (10YR 7/1) fine sand; single grained; loose; common fine and few coarse roots; neutral; clear wavy boundary.
C/Bh1—20 to 40 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; 10 percent dark brown (7.5YR 4/4) and reddish brown (5YR 5/3) Bh bodies; few medium and coarse roots; neutral; gradual wavy boundary.
C/Bh2—40 to 53 inches; brownish yellow (10YR 6/8) fine sand; common medium distinct dark reddish brown (5YR 3/2) vertical bands and mottles and thin streaks of yellowish brown (10YR 5/6); single grained; loose; few coarse roots; few coarse, weakly cemented reddish brown (5YR 4/4) concretions; few small pockets of uncoated sand grains; neutral; gradual wavy boundary.
C1—53 to 70 inches; light yellowish brown (10YR 6/4) fine sand; common medium faint brown (10YR 5/3) mottles and common medium distinct light gray (10YR 7/1) mottles; single grained; loose; neutral; gradual wavy boundary.
C2—70 to 80 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; neutral.

The sandy horizons extend to 80 inches or more. The soil ranges from strongly acid to neutral throughout, unless the surface layer has been limed.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. Texture is sand or fine sand.

The C part of the C/Bh horizon has hue of 10YR, value of 5 to 8, and chroma of 4 to 8. The Bh part of the C/Bh horizon has hue of 5YR to 10YR, value of 3 to 6, and chroma of 2 to 6. The C/Bh horizon is sand or fine sand.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 8. Mottles are in shades of these colors. Texture is sand, fine sand, or loamy sand.

Lafitte Series

The Lafitte series consists of very poorly drained soils on low flood plains adjoining salt water. They are below 5 feet in elevation and are flooded daily with saline water. The soils formed from herbaceous plant residue and small amounts of mineral soil sediment. Slopes are less than 1 percent.

Typical pedon of Lafitte muck, 4.0 miles west of Southport, 0.8 mile southwest of Long Beach Bridge and 250 feet south of the Intracoastal Waterway, in marsh:

Oa1—0 to 12 inches; dark brown (7.5YR 3/2) muck pressed and rubbed; about 35 percent fiber, about 15 percent rubbed; massive; many fine and medium live roots; few coarse stems; about 50 percent mineral content; moderately alkaline; clear smooth boundary.

Oa2—12 to 30 inches; black (10YR 2/1) muck rubbed and pressed; about 30 percent fiber, about 5 percent rubbed; massive; few fine and medium roots; about 60 percent mineral content; moderately alkaline; gradual wavy boundary.

Oa3—30 to 40 inches; very dark brown (10YR 2/2) muck pressed and rubbed; about 35 percent fiber, about 10 percent rubbed; massive; common medium roots; few coarse stems; about 50 percent mineral content; moderately alkaline; gradual wavy boundary.

Oa4—40 to 55 inches; very dark gray (10YR 3/1) muck and thin dark gray (5Y 4/1) mineral strata; about 5 percent fiber, about 1 percent rubbed fiber; massive; about 70 percent mineral; moderately alkaline; gradual wavy boundary.

2Cg—55 to 72 inches; gray (5Y 5/1) silty clay; massive; flows easily through fingers when squeezed; moderately alkaline.

The decomposed organic layers range from 51 inches to more than 80 inches thick. The soil ranges from neutral to moderately alkaline.

The surface and subsurface organic layers have hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2.

The underlying mineral soil has hue of 5Y or 5GY, or it is neutral, and has value of 3 to 5, and chroma of 0 to 2. It is silty clay or clay.

Leon Series

The Leon series consists of poorly drained soils on uplands. The soils formed in coarse textured sediment. Slopes are less than 1 percent.

Typical pedon of Leon fine sand is 2.2 miles south of Grissettown, 1.6 miles west of the intersection of N.C. Highway 904 and State Road 1163, 50 feet south of State Road 1163:

A—0 to 6 inches; dark gray (10YR 4/1) fine sand; single grained; loose; about 1/3 sand grains are uncoated; common medium and fine roots; extremely acid; clear wavy boundary.

E—6 to 14 inches; light gray (10YR 7/1) fine sand; single grained; loose; very strongly acid; clear wavy boundary.

Bh1—14 to 17 inches; black (5YR 2/1) fine sand; massive; friable; weakly cemented; very strongly acid; gradual wavy boundary.

Bh2—17 to 23 inches; dark reddish brown (5YR 3/3) fine sand; few medium faint black (5YR 2/1) mottles; massive; friable; weakly cemented; very strongly acid; clear irregular boundary.

E'—23 to 30 inches; light gray (10YR 7/1) fine sand; single grained; loose; very strongly acid; gradual wavy boundary.

B'h—30 to 35 inches; black (5YR 2/1) fine sand; massive; weakly cemented; very strongly acid; gradual wavy boundary.

E"—35 to 42 inches; brown (10YR 4/3) fine sand; single grained; loose; very strongly acid; gradual wavy boundary.

B"h1—42 to 72 inches; black (5YR 2/1) fine sand; massive; weakly cemented; very strongly acid; gradual wavy boundary.

B"h2—72 to 80 inches; dark gray (5YR 4/1) fine sand; massive; weakly cemented; very strongly acid.

The sandy horizons are 80 inches thick or more. The soil is extremely acid or very strongly acid throughout, unless the surface layer has been limed.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Texture is sand or fine sand.

The Bh horizon has hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. Texture is fine sand or sand.

The lower E', B'h, E", and B"h horizons have hue of 5YR to 10YR, value of 2 to 7, and chroma of 1 or 2. Texture is sand or fine sand.

Lumbee Series

The Lumbee series consists of poorly drained soils on stream terraces. The soils formed in moderately fine textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Lumbee fine sandy loam, 1 mile northwest of Regan, 1.4 miles northeast of the intersection of N.C. Highway 904 and forest road, 30 feet north of forest road:

A—0 to 6 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

E—6 to 18 inches; light brownish gray (10YR 6/2) fine sandy loam; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

Btg1—18 to 28 inches; gray (10YR 6/1) sandy clay loam; few medium prominent red (2.5YR 5/8) mottles and common medium distinct brownish yellow (10YR 6/8) mottles; weak fine subangular

blocky structure; friable, slightly sticky and slightly plastic; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—28 to 38 inches; gray (10YR 6/1) sandy clay loam; many medium distinct reddish yellow (7.5YR 6/8) mottles; weak fine subangular blocky structure; very friable; very strongly acid; clear wavy boundary.

2Cg—38 to 80 inches; mottled white (10YR 8/1), gray (10YR 6/1), and yellow (10YR 7/6) sand; single grained; loose; very strongly acid.

The loamy horizons are less than 40 inches thick over sandy sediment. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2. Texture is fine sandy loam, sandy loam, or loamy sand.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, yellow, brown, or gray. The Btg horizon is sandy clay loam or sandy loam.

The BCg horizon, where present, has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2. Mottles are in shades of red, yellow, brown, or gray. Texture is sandy loam or loamy sand.

The 2Cg horizon has hue of 10YR to 5Y, value of 5 to 8, and chroma of 1, or it is mottled in shades of yellow, brown, or red. Texture is sand or loamy sand.

Lynchburg Series

Lynchburg series consists of somewhat poorly drained soils on uplands. The soils formed in moderately fine textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Lynchburg fine sandy loam, 2 miles northeast of Bolivia on U.S. Highway 17, 50 feet northeast of the intersection of U.S. Highway 17 and State Road 1514:

Ap—0 to 9 inches; dark gray (10YR 4/1) fine sandy loam; weak medium granular structure; very friable; few fine and medium roots; slightly acid; abrupt smooth boundary.

BA—9 to 14 inches; light yellowish brown (10YR 6/4) fine sandy loam; common fine distinct light brownish gray (10YR 6/2) mottles and brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; very friable; few fine roots; medium acid; gradual wavy boundary.

Btg1—14 to 22 inches; gray (10YR 6/1) sandy clay loam; few fine distinct brownish yellow (10YR 6/6) mottles and few medium prominent red (2.5YR 4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common discontinuous clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—22 to 45 inches; gray (10YR 6/1) sandy clay loam; few fine distinct red (2.5YR 4/8) mottles and common medium and coarse distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly plastic; common discontinuous clay films on faces of peds; very strongly acid, gradual wavy boundary.

Btg3—45 to 64 inches; gray (10YR 5/1) sandy clay loam; few fine distinct brownish yellow (10YR 6/6) and red (2.5YR 4/6) mottles; weak fine subangular blocky structure; firm, sticky and plastic; very strongly acid; gradual wavy boundary.

Cg—64 to 80 inches; gray (10YR 5/1) clay loam that has pockets of sandy clay loam; few fine distinct brownish yellow (10YR 6/6) and red (2.5YR 4/8) mottles; massive; firm; very strongly acid.

The loamy horizons are more than 60 inches thick over stratified sediment. The soil is very strongly acid or strongly acid, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2.

The E horizon, where present, has hue of 10YR, value of 6 or 7, and chroma of 2 or 3. Texture is sandy loam or fine sandy loam.

The BA horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. Mottles in chroma of 1 or 2 are few to common.

The upper part of the Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 6. The lower part of the Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles in shades of red, brown, or yellow are throughout the Btg horizon. The Btg horizon is sandy clay loam or sandy loam in the upper part and sandy clay loam or sandy clay in the lower part.

The Cg horizon has hue of 10YR, 2.5Y, or 5BG, value of 5 to 7, and chroma of 1 or 2. It is stratified sandy loam, sandy clay loam, clay loam, or clay.

Mandarin Series

The Mandarin series consists of somewhat poorly drained soils on uplands. They formed in coarse textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Mandarin fine sand, 2.2 miles southwest of Grissettown, 1.5 miles west of the intersection of N.C. Highway 904 and State Road 1163, 0.4 mile south of State Road 1163, in woods:

A—0 to 5 inches; gray (10YR 6/1) fine sand; single grained; loose; few fine and medium roots; many uncoated sand grains; extremely acid; clear wavy boundary.

E—5 to 18 inches; white (10YR 8/1) fine sand; single grained; loose; few medium and coarse roots; extremely acid; abrupt wavy boundary.
Bh1—18 to 28 inches; dark brown (7.5YR 3/2) fine sand; friable; weakly cemented; few medium roots; sand grains coated with organic matter; very strongly acid; gradual wavy boundary.
Bh2—28 to 35 inches; black (5YR 2/1) fine sand; common medium distinct brown (7.5YR 4/4) mottles; massive; friable; weakly cemented; very strongly acid; clear irregular boundary.
E'—35 to 45 inches; light gray (10YR 7/2) fine sand; single grained; loose; very strongly acid; clear wavy boundary.
B'h—45 to 52 inches; black (5YR 2/1) fine sand; few coarse distinct brown (7.5YR 4/4) mottles; massive; very friable; very strongly acid; clear irregular boundary.
E"—52 to 62 inches; light gray (10YR 7/2) fine sand; single grained; loose; few 1/4 to 1/2-inch bodies of Bh; very strongly acid; gradual wavy boundary.
B"h1—62 to 75 inches; dark reddish brown (5YR 3/2) fine sand, massive; very friable; weakly cemented; very strongly acid; gradual wavy boundary.
B"h2—75 to 80 inches; dark reddish brown (5YR 2/2) sand; massive; very friable; weakly cemented; very strongly acid.

The sandy horizons are 80 inches thick or more. The soil is extremely acid or very strongly acid in the surface layer and upper part of the subsoil unless the surface layer has been limed and very strongly acid to neutral in the lower part of the subsoil.

The A or Ap horizon has hue of 10YR, value of 3 to 6, and chroma of 1.

The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. It is sand or fine sand.

The Bh horizon has hue of 10YR to 5YR, value of 2 or 3, and chroma of 1 to 3. Texture is sand or fine sand.

The E' and E" horizons have the same colors as the E horizon. Texture is sand or fine sand.

The B'h and B"h layers have the same colors as the Bh horizon. Texture is sand or fine sand.

Marvyn Series

The Marvyn series consists of well drained soils on uplands. The soils formed in moderately fine textured sediment. Slopes are 6 to 12 percent.

Typical pedon of Marvyn loamy fine sand, 6 to 12 percent slopes, from an area of Baymeade and Marvyn soils, 6 to 12 percent slopes, 0.7 mile northwest of Town Creek, 0.5 mile south of the intersection of State Road 1413 and State Road 1412 on woods road, 300 feet west of woods road:

A—0 to 5 inches; grayish brown (10YR 5/2) loamy fine sand; weak medium granular structure; very friable; many medium and coarse roots; very strongly acid; clear wavy boundary.
BE1—5 to 11 inches; yellowish brown (10YR 5/4) loamy fine sand; weak medium granular structure; very friable; many medium and coarse roots; very strongly acid; clear wavy boundary.
BE2—11 to 16 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium granular structure; very friable; few medium roots; very strongly acid; gradual wavy boundary.
Bt—16 to 31 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct red (2.5YR 4/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few patchy clay films on faces of peds; few medium roots; very strongly acid; gradual wavy boundary.
BC—31 to 45 inches; brownish yellow (10YR 6/6) sandy clay; few medium prominent red (2.5YR 4/8) mottles and common fine distinct gray (10YR 6/1) mottles; weak fine angular blocky structure; firm, sticky and plastic; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.
C1—45 to 54 inches; gray (10YR 6/1) sandy clay loam that has thin strata of sandy clay; common coarse distinct yellow (10YR 7/8) mottles; massive; firm, sticky and plastic; very strongly acid; gradual wavy boundary.
C2—54 to 80 inches; mottled light gray (10YR 7/1), yellow (10YR 7/8), and strong brown (7.5YR 5/6) sandy loam that has thin strata of sandy clay loam and loamy sand; massive; friable; very strongly acid.

The loamy Bt horizons are 15 to 35 inches thick over stratified sediment. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Texture is loamy sand or loamy fine sand.

The BE horizon, where present, has hue of l0YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam or fine sandy loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. The Bt horizon is sandy clay loam, or it may be sandy clay in the lower part.

The BC horizon, if present, has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. Mottles are in shades of yellow, brown, red, or gray. The BC horizon is sandy clay loam or sandy clay.

The C or 2C horizon is generally gray and mottled in shades of yellow, brown, and red, and ranges from loamy sand to clay.

Muckalee Series

The Muckalee series consists of poorly drained soils on low flood plains. The soils formed in moderately coarse textured recent alluvium. Slopes are 0 to 2 percent.

Typical pedon of Muckalee loam, 1.3 miles southwest of Waccamaw; 0.8 mile northeast of the intersection of State Road 1321 and State Road 1322; 250 feet west of State Road 1321:

A—0 to 6 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable; many fine roots; strongly acid; gradual wavy boundary.

Cg1—6 to 22 inches; grayish brown (10YR 5/2) loamy sand; common medium faint light brownish gray (10YR 6/2) mottles; single grained; very friable; common fine roots; medium acid; gradual wavy boundary.

Cg2—22 to 36 inches; gray (10YR 6/1) sandy loam that has lenses of sandy clay loam; few medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; massive; friable; few fine and medium roots; medium acid; gradual wavy boundary.

Cg3—36 to 65 inches; gray (10YR 6/1) loamy sand that has strata of sandy loam; common medium distinct strong brown (7.5YR 5/8) and light olive brown (2.5Y 5/6) mottles and few medium distinct greenish gray (5G 5/1) mottles; massive; friable; slightly acid.

The loamy or sandy horizons are 40 inches thick or more. The soil ranges from strongly acid to slightly acid in the A horizons and medium acid to neutral in the underlying materials.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2.

The Cg horizon has hue of 10YR or 5Y, value of 3 to 7, and chroma of 1 or 2. The Cg horizon is generally sandy loam that has fragments of marl in the lower part. Texture includes sand, loamy sand, loam, fine sandy loam, and thin layers of sandy clay loam.

Murville Series

The Murville series consists of very poorly drained soils in depressions on uplands. The soils formed in coarse textured sediment with an abundance of organic matter. Slopes are 0 to 2 percent.

Typical pedon of Murville mucky fine sand, 1.2 miles southeast of Boiling Spring Lake, 0.2 mile northwest of the intersection of N.C. Highway 133 and N.C. Highway 87, 35 feet east of N.C. Highway 133:

A—0 to 5 inches; black (5YR 2/1) mucky fine sand; weak medium granular structure; very friable; common medium and fine roots; extremely acid; gradual wavy boundary.

Bh1—5 to 35 inches; black (5YR 2/1) fine sand; massive; very friable; few large roots; sand grains are coated with organic matter and feel loamy; extremely acid; gradual wavy boundary.

Bh2—35 to 55 inches; dark reddish brown (5YR 3/2) fine sand; massive; very friable; sand grains are coated and bridged with organic matter and feel loamy; extremely acid; gradual wavy boundary.

Bh3—55 to 60 inches; dark reddish brown (5YR 2/2) fine sand; massive; very friable; extremely acid; gradual wavy boundary.

Bh4—60 to 80 inches; dark reddish brown (5YR 3/2) fine sand; massive; very friable; extremely acid.

The sandy horizons are 80 inches thick or more. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. Sand grains are coated with organic matter and have a soft, loamy feel. Texture is fine sand or sand.

The Cg horizon, where present, has hue of 10YR, value of 5 to 7, and chroma of 1 to 4. Mottles are in shades of these colors. Texture ranges from sand to sandy clay loam.

Newhan Series

The Newhan series consists of excessively drained soils on the Outer Banks. The soils formed in coarse textured eolian and marine sediments. Slopes are 2 to 30 percent.

Typical pedon of Newhan fine sand, 2 to 30 percent slopes, on Ocean Isle Beach, 0.7 mile west of the intersection of N.C. Highway 904 and State Road 1144, 50 feet north of State Road 1144:

A—0 to 1 inch; grayish brown (10YR 5/2) fine sand; single grained; loose; mildly alkaline; clear wavy boundary.

C—1 inch to 80 inches; light gray (10YR 7/2) fine sand; few fine faint pale brown (10YR 6/3) mottles; single grained; loose; common dark minerals; few shell fragments; mildly alkaline.

The sandy horizons are 80 inches thick or more. The soil is neutral or mildly alkaline throughout. The silt plus clay content is less than 5 percent. Calcareous shell fragments range from 0 to 25 percent of the soil volume, and the soil has few to common grains of dark minerals.

The A horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 1 or 2.

The C horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. Texture is fine sand or sand.

Norfolk Series

The Norfolk series consists of well drained soils on uplands. The soils formed in moderately fine textured sediment. Slopes range from 2 to 6 percent.

Typical pedon of Norfolk loamy fine sand, 2 to 6 percent slopes, 2.6 miles north of the community of North West on State Road 1422; 50 feet west of road, in a pine plantation:

A—0 to 5 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak medium granular structure; very friable; many fine roots; very strongly acid; clear wavy boundary.

E—5 to 16 inches; light yellowish brown (2.5Y 6/4) loamy fine sand; weak medium granular structure; very friable; common fine and medium roots; strongly acid; clear wavy boundary.

Bt1—16 to 36 inches; yellowish brown (10YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—36 to 63 inches; brownish yellow (10YR 6/6) sandy clay loam; few medium distinct strong brown (7.5YR 5/8) and red (2.5YR 5/8) mottles, and few fine distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—63 to 80 inches; brownish yellow (10YR 6/6) sandy loam that has lenses of sandy clay loam; few fine distinct strong brown (7.5YR 5/6) and light gray (10YR 7/1) mottles; weak coarse subangular blocky structure; friable; very strongly acid.

The sandy A and E horizons and loamy Bt horizons are more than 60 inches thick over stratified sediment. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. Texture is loamy sand or loamy fine sand.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 to 8. The lower part of the Bt horizon and the BC horizon are in shades of gray, brown, yellow, or red, or they are mottled in these colors. Texture is dominantly sandy clay loam but ranges to sandy loam, clay loam, or sandy clay in the lower part of some pedons.

The C horizon is stratified with layers of sandy clay loam, sandy loam, or loamy sand.

Onslow Series

The Onslow series consists of moderately well drained soils on uplands. The soils formed in moderately fine Coastal Plain sediment. Slopes are 0 to 3 percent.

Typical pedon of Onslow fine sandy loam, 4.5 miles southeast of Boiling Spring Lakes, 2.8 miles east of the intersection of N.C. Highway 87 and N.C. Highway 133, and 1.0 mile south of Sunny Point Railroad Terminal, on a dirt road:

A—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; strongly acid; clear smooth boundary.

E/Bh—3 to 9 inches; pale brown (10YR 6/3) fine sandy loam; 15 percent dark brown (7.5YR 4/4), strong brown (7.5YR 5/6), and dark reddish brown (5YR 3/2) Bh bodies; weak medium granular structure; very friable; very fine, slightly brittle to brittle yellow (10YR 7/6) nodules; strongly acid; clear wavy boundary.

E1—9 to 17 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; few fine distinct brownish yellow (10YR 6/6) mottles; weak fine granular structure; very friable; very strongly acid; clear wavy boundary.

E2—17 to 22 inches; pale brown (10YR 6/3) fine sandy loam; few fine faint yellowish brown mottles; weak fine subangular blocky structure; very friable; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

Bt—22 to 39 inches; mottled strong brown (7.5YR 5/8), brownish yellow (10YR 6/6), light brownish gray (2.5Y 6/2), and light yellowish brown (10YR 6/4) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg1—39 to 50 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—50 to 65 inches; gray (10YR 6/1) sandy clay loam that has pockets of sandy clay; common medium distinct brownish yellow (10YR 6/8) and strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable; common patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg3—65 to 80 inches; light brownish gray (10YR 6/2) sandy clay loam that has pockets of gray (5Y 6/1) sandy loam and clay loam; common medium distinct light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic;

few patchy clay films on faces of peds; very strongly acid.

The loamy horizons are more than 60 inches thick over stratified sediment. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2.

The E part of the E/Bh horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. The Bh part of the E/Bh horizon has hue of 5YR to 10YR, value of 2 to 5, and chroma of 2 to 6. It is discontinuous and makes up 15 to 60 percent of the E/Bh horizon. Up to 20 percent of the Bh part of this horizon is weakly to strongly cemented Bh concretions.

The E horizon, where present, has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 2 to 4. Texture is fine sandy loam, sandy loam, loamy sand, or loamy fine sand.

The BE horizon, where present, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 3 to 8. Texture is fine sandy loam, sandy loam, or sandy clay loam.

The Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 8, or it is mottled. Gray mottles are within 20 to 30 inches of the surface of the soil. The Bt horizon is fine sandy loam or sandy clay loam.

The Btg horizon is similar in color and texture to the Bt horizon.

The Cg horizon is clay loam, sandy clay loam, or sandy loam.

Pactolus Series

The Pactolus series consists of moderately well drained and somewhat poorly drained soils on uplands. The soils formed in coarse textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Pactolus fine sand, 0 to 2 percent slopes, 2 miles east of Calabash, 1.5 miles northwest of Sunset Beach Bridge, 1.2 miles southeast of the intersection of N.C. Highway 179 and State Road 1163, 50 feet west of woods road:

A1—0 to 2 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine roots; few uncoated sand grains; very strongly acid; clear wavy boundary.

A2—2 to 10 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; common medium roots; few uncoated sand grains; strongly acid; gradual wavy boundary.

C1—10 to 26 inches; very pale brown (10YR 7/3) fine sand; few medium faint light gray (10YR 7/2) mottles; single grained; loose; common uncoated sand grains; strongly acid; gradual wavy boundary.

C2—26 to 55 inches; mottled light gray (10YR 7/2), very pale brown (10YR 7/3), and brownish yellow (10YR 6/6) fine sand; single grained; loose; strongly acid; gradual wavy boundary.

C3—55 to 80 inches; light yellowish brown (10YR 6/4) fine sand; common medium distinct light gray (10YR 7/2) mottles; single grained; loose; strongly acid.

The sandy horizons are 80 inches thick or more. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed.

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3.

The upper part of the C horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4. The lower part of the C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4, or it is mottled in these colors. Texture ranges from fine sand to loamy fine sand.

Pantego Series

The Pantego series consists of very poorly drained soils on uplands. The soils formed in medium textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Pantego mucky loam, 4.4 miles northwest of Town Creek in Green Swamp Forest, 1.5 miles southwest of Shilo Church and 2.5 miles northeast of the intersection of State Road 1410 and State Road 1411, 0.9 mile north of the intersection of forest roads and Schulkins Trail:

A—0 to 11 inches; black (10YR 2/1) mucky loam; weak medium granular structure; friable; many fine roots; extremely acid; abrupt smooth boundary.

E—11 to 15 inches; dark gray (10YR 4/1) loam; weak medium granular structure; friable; extremely acid; clear wavy boundary.

Btg1—15 to 36 inches; dark gray (10YR 4/1) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; extremely acid; gradual wavy boundary.

Btg2—36 to 48 inches; dark gray (10YR 4/1) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; extremely acid; gradual wavy boundary.

BCg—48 to 64 inches; dark gray (10YR 4/1) sandy clay loam that has lenses of loamy sand and clay loam; massive; friable, slightly sticky and slightly plastic; extremely acid; gradual wavy boundary.

Cg—64 to 80 inches; gray (10YR 6/1) sandy loam that has thin layers of sandy clay loam and loamy sand; common fine distinct light yellowish brown (10YR 6/4) mottles; massive; friable; extremely acid.

The loamy horizons are more than 60 inches thick over stratified sediment. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1.

The E horizon, where present, has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is loam or sandy loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. The Btg horizon is sandy loam, sandy clay loam, or sandy clay.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. It is sandy clay loam or sandy loam that has thin layers of loamy sand and sand.

Rains Series

The Rains series consists of poorly drained soils on uplands. The soils formed in moderately fine textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Rains fine sandy loam, 4 miles southwest of Bell Swamp, 1.5 miles northeast of Bolivia, 0.5 mile west of the intersection of U.S. Highway 17 and State Road 1514, 10 feet north of woods road:

Ap—0 to 4 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

E—4 to 15 inches; dark gray (10YR 4/1) fine sandy loam; weak medium granular structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

Btg1—15 to 37 inches; gray (10YR 5/1) sandy clay loam; common fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine pores; common patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—37 to 60 inches; gray (10YR 5/1) sandy clay loam; many medium distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine pores; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg—60 to 72 inches; gray (10YR 6/1) sandy clay loam that has thin strata of sandy loam; many coarse distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.

Cg—72 to 80 inches; light gray (10YR 7/1) sandy clay loam that has thin strata of sandy loam; common medium distinct brownish yellow (10YR 6/8) mottles and few fine distinct reddish yellow (7.5YR 6/8) mottles; massive; friable, slightly sticky and slightly plastic; very strongly acid.

The loamy horizons are more than 60 inches thick over stratified sediment. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Texture is sandy loam or fine sandy loam.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Texture is dominantly sandy clay loam or clay loam.

The BCg horizon has hue of 10YR, value of 4 to 7, and chroma of 1, or it is neutral. Texture is sandy clay loam or sandy clay.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It is stratified sandy loam, sandy clay loam, clay loam, or sandy clay.

Tomahawk Series

The Tomahawk series consists of somewhat poorly drained and moderately well drained soils on uplands. The soils formed in moderately coarse textured sediment over sandy sediment consisting of layers that have humus coated sand grains. Slopes are 0 to 3 percent.

Typical pedon of Tomahawk loamy fine sand, 1.1 miles west of Exum, 200 feet south of State Road 1336, in field:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

E—6 to 12 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak medium granular structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

Bt—12 to 23 inches; brownish yellow (10YR 6/6) fine sandy loam; weak medium granular structure; very friable; very strongly acid; clear wavy boundary.

E'—23 to 34 inches; yellowish brown (10YR 5/4) loamy fine sand; common medium distinct white (10YR 8/2) mottles; weak medium granular structure; very friable; very strongly acid; gradual wavy boundary.

2Bhb1—34 to 57 inches; dark reddish gray (5YR 4/2) fine sand; few coarse distinct dark reddish brown (5YR 3/2) mottles; thin streaks of uncoated pinkish gray (5YR 7/2) fine sand; massive; weakly cemented; very strongly acid; gradual wavy boundary.

2Bhb2—57 to 65 inches; dark reddish brown (5YR 2/2) fine sand; common medium distinct reddish brown (5YR 4/3) mottles; massive; weakly cemented; very strongly acid; gradual wavy boundary.

Cg—65 to 80 inches; grayish brown (10YR 5/2) sand; few medium distinct strong brown (7.5YR 5/8) mottles; single grained; loose; very strongly acid.

The sandy or loamy horizons range from 30 to 60 inches over a lower sequence of humus-coated sand horizons. The soil is very strongly acid or strongly acid throughout, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4. Texture is loamy fine sand or loamy sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. Low chroma mottles are within 30 inches of the surface. Some pedons have mottles that are yellow or in shades of brown and red. Texture is sandy loam or fine sandy loam.

The E' horizon, where present, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 4. Texture is loamy fine sand, fine sand, or loamy sand.

The 2Bhb horizon has hue of 5YR or 7.5YR, value of 2 to 5, and chroma of 1 or 2. Texture is sand or fine sand.

The Cg horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 1 to 3. Texture ranges from fine sand and sand to loamy fine sand and loamy sand.

The Tomahawk soil as mapped in this county has a sandy surface layer less than 20 inches thick. It is considered a taxadjunct to the Tomahawk series on this basis. There is no difference in use and management or behavior between this taxadjunct and the Tomahawk series.

Torhunta Series

The Torhunta series consists of very poorly drained soils on uplands and stream terraces. They formed in coarse and medium textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Torhunta mucky fine sandy loam, 1.25 miles north of Freeland on State Road 1333, 0.25 mile east on a farm road, 60 feet south of road, in a field:

Ap—0 to 11 inches; black (10YR 2/1) mucky fine sandy loam; weak medium granular structure; very friable; very strongly acid; gradual smooth boundary.

A—11 to 22 inches; dark grayish brown (10YR 4/2) fine sandy loam; thin coats of very dark gray (10YR 3/l) organic matter on sand grains projecting 3 or 4 inches into the horizon; weak medium subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Bwg—22 to 32 inches; grayish brown (10YR 5/2) fine sandy loam; few medium faint very dark grayish brown (10YR 3/2) mottles; weak medium subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

BCg—32 to 50 inches; grayish brown (10YR 5/2) fine sandy loam that has pockets of loamy sand and sand; few fine faint very dark grayish brown (10YR 3/2) mottles and few fine distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Cg—50 to 80 inches; light gray (10YR 7/2) loamy sand; few fine distinct brownish yellow (10YR 6/8) mottles; massive; very friable; very strongly acid.

The loamy A and B horizons range from 30 to 50 inches thick. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 0 to 2.

The Bwg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 0 to 2. Texture is sandy loam or fine sandy loam.

The BCg and Cg horizons have hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 0 to 2. Mottles are in shades of brown or yellow. Texture is fine sandy loam, loamy fine sand, loamy sand, sandy loam, or sand.

Wando Series

The Wando series consists of excessively drained soils on uplands. The soils formed in coarse textured sediment. Slopes are 0 to 6 percent.

Typical pedon of Wando fine sand, 0 to 6 percent slopes, on Bowen Point; 0.3 mile west of the intersection of State Road 1137 and State Road 1138, 50 feet north of State Road 1138, in woods:

Ap—0 to 8 inches; dark brown (10YR 4/3) fine sand; single grained; loose; many fine and medium roots; many uncoated sand grains giving a "salt-and-pepper" appearance; strongly acid; clear smooth boundary.

C1—8 to 35 inches; strong brown (7.5YR 5/8) fine sand; single grained; loose; common fine and medium roots; medium acid; gradual wavy boundary.

C2—35 to 55 inches; strong brown (7.5YR 5/6) fine sand; single grained; loose; few fine and medium roots; medium acid; gradual wavy boundary.

C3—55 to 75 inches; strong brown (7.5YR 5/6) fine sand that has thin strata of coarse sand; single grained; loose; few medium, weakly cemented, light red (2.5YR 6/6) concretions; medium acid; gradual wavy boundary.

C4—75 to 99 inches; yellow (10YR 7/6) fine sand; single grained; loose; strongly acid.

The sandy A and C horizons extend to a depth of 60 inches or more. The A horizon ranges from strongly acid to neutral, unless the surface layer has been limed. The C horizon ranges from very strongly acid to neutral.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 8. Texture is fine sand or sand. The control section is 5 to 15 percent silt plus clay. Some pedons have few to common medium reddish brown mottles and iron concretions.

Woodington Series

The Woodington series consists of poorly drained soils on uplands. The soils formed in moderately coarse textured sediment. Slopes are 0 to 2 percent.

Typical pedon of Woodington fine sandy loam, 4 miles southwest of Maco, 6.5 miles north of the intersection of State Road 1140 and State Road 1433, 3 miles northeast of the intersection of Jack Skipper CCC Road and State Road 1413:

OA—0 to 6 inches; very dark gray (10YR 3/1) fine sandy loam; weak fine granular structure; very friable; common fine roots; extremely acid; clear wavy boundary.

E1—6 to 14 inches; gray (10YR 5/1) fine sandy loam; weak fine granular structure; very friable; common fine roots; extremely acid; gradual wavy boundary.

E2—14 to 18 inches; gray (10YR 5/1) fine sandy loam; few fine distinct brownish yellow (10YR 6/8) mottles; weak medium granular structure; very friable; very strongly acid; gradual wavy boundary.

Btg1—18 to 32 inches; gray (10YR 5/1) fine sandy loam; common fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; sand coated and bridged with clay; very friable; very strongly acid; gradual wavy boundary.

Btg2—32 to 55 inches; light gray (10YR 6/1) fine sandy loam that has pockets of loamy sand; common fine distinct reddish yellow (7.5YR 6/8) mottles; weak fine subangular blocky structure; sand coated and bridged with clay; very friable; very strongly acid; gradual wavy boundary.

Btg3—55 to 70 inches; light gray (10YR 7/1) sandy loam that has strata of loamy sand; common fine distinct brownish yellow (10YR 6/6) mottles; thin strata of white (10YR 8/I) clean sand grains; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Cg—70 to 80 inches; light gray (5Y 7/1) loamy sand that has strata of sandy loam and sand; few fine distinct brownish yellow (10YR 6/6) mottles; massive; very friable; very strongly acid.

The loamy horizons extend to a depth of more than 60 inches. The soil ranges from extremely acid to strongly acid, unless the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Texture is fine sandy loam, loamy fine sand, or sandy loam.

The Btg horizon has hue of 10YR or 2.5Y, values of 5 to 7, and chroma of 1 or 2. Most pedons have mottles in shades of brown, yellow, and red. Texture of the Btg horizon is fine sandy loam or sandy loam.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. Mottles are in shades of brown, yellow, and red. Texture is loamy sand or sand that has strata of loamy material.

Yaupon Series

The Yaupon series consists of somewhat poorly drained to moderately well drained soils near the edges of the mainland. The soils formed in fine textured soil material deposited by dredging operations. Slopes range from 0 to 3 percent.

Typical pedon of Yaupon silty clay loam, 0 to 3 percent slopes, 0.1 mile northeast of the bridge of N.C. Highway 133 and the Intracoastal Waterway, 0.1 mile south of the intersection of N.C. Highway 133 and service road:

A—0 to 7 inches; dark gray (10YR 4/1) silty clay loam, common medium distinct yellowish red (5YR 4/6) mottles; moderate medium platy structure; firm, sticky and plastic; few fine roots; very strongly acid; gradual smooth boundary.

Cg1—7 to 20 inches; dark gray (5Y 4/1) silty clay; massive; very firm, very sticky and very plastic; mildly alkaline; gradual smooth boundary.

Cg2—20 to 30 inches; dark greenish gray (5GY 4/1) silty clay; common medium distinct dark gray (5Y 4/1) mottles; massive; firm, very sticky and very plastic; few small dark reddish brown (5YR 3/2) concretions; moderately alkaline; gradual smooth boundary.

Cg3—30 to 76 inches; dark greenish gray (5GY 4/1) silty clay; massive; firm, very sticky and very plastic; few small dark reddish brown (5YR 3/2) concretions; moderately alkaline; clear smooth boundary.

Ab—76 to 85 inches; black (10YR 2/1) fine sandy loam; weak medium granular structure; very friable; very strongly acid.

Thickness of the dredge spoil soil material ranges from 20 to more than 80 inches. Shrinkage cracks open at the surface and range from 15 to 35 inches apart. They are from 2 to 4 inches wide, ranging up to 6 or 8 inches in some places, about 30 inches deep, and are commonly filled with fine sand. The soil ranges from very strongly acid to medium acid in the A horizon and from very strongly acid to moderately alkaline in the C horizon. Shells and shell fragments range from 0 to 20 percent in individual horizons. The gley color is not indicative of the present drainage but of the condition of the original sediment.

The A horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 0 to 2.

The Cg horizon has hue of 10YR to 5G or 5B, value of 4 to 6, and chroma of 1 to 8. It is sandy clay, clay loam, silty clay, or clay. The 10- to 40-inch control section averages from 35 to 60 percent clay and from 35 to 65 percent silt. The underlying buried horizon is variable in color and texture.

Factors of Soil Formation

Soil is the product of the combined effects of plants and animals, climate, parent material, relief, and time. These five factors determine the characteristics of the soil in any of the natural soil bodies. They achieve their influence by a variety of processes.

The processes of soil formation include: additions of organic and mineral material to the soil as solids, liquids, and gasses; losses of these materials from the soil; translocation of material from one point to another within the soil; and transformation of mineral and organic substances within the soil.

Climate

Climate is a major determinant of the kinds of plants and animals living in and on the soil. The climate of Brunswick County is warm and humid. The seasons are modified some by maritime breezes, but generally summers are long and hot, and winters are short and mild. Mild temperatures and abundant rainfall promote rapid growth of plants and rapid decomposition of organic matter, hasten chemical reactions, speed leaching of soluable bases, and increase translocation of the less soluable fine particles in the soil profile. Consequently, the soils, except for those that formed in marl and tidal marsh, are acid, strongly leached, and low in base saturation. The soils have a higher content of clay in the B horizon than in the A or C horizon, except for the soils that formed in sand and recent alluvium.

Relief

The relief in Brunswick County is largely the result of the dissection of about two-thirds of the original, nearly level coastal plains by the Waccamaw, Cape Fear, Elizabeth, Lockwood Folly, Shallote, and Calabash Rivers and their tributaries. The degree of dissection of the landscape affects the formation of the soils by influencing the depth of the water table and by affecting the rate of the natural erosion of soil material.

On short, sharply rounded side slopes of well dissected areas, the soils have a deep water table, a light colored A horizon, a thick E horizon, and a brightly colored B horizon. The soils in these areas are Blanton, Baymeade, Norfolk, Goldsboro, Foreston, Onslow, and Marvyn soils.

On the nearly level parts of slightly dissected, broad, interstream areas, the soils typically have a shallow water table. This results in a dark colored A horizon, a thin E horizon, and a gray B horizon. The soils in these areas are Lynchburg, Rains, Woodington, Pantego, Torhunta, and Tomahawk soils. In sandy material a shallow water table can facilitate the coating of sand grains with humus and the forming of spodic horizons. Leon, Mandarin, and Murville soils formed under these conditions.

On flat parts of undissected, broad, interstream areas the soils frequently have a high water table for long periods. In these flat areas the rainfall exceeds evapotranspiration, subsurface drainage, and the slow overland flow of water. The resulting surface ponding creates an accumulation of organic matter. Croatan muck is the main soil in these areas.

Time

Two major influences of time are the extent of physical and chemical changes within soil material and changes in landscape (relief). The extent of weathering of rock materials and the build-up of organic matter changes with time. Relief changes through time under the impact of erosion.

Some of the variation in the soils of Brunswick County reflects a difference in age. The young Muckalee soils have formed in geologically recent deposits on nearly level flood plains. They have almost no horizon development and very thin profiles. The older Johns soils formed on geologically older, nearly level stream terraces. They have well developed horizons and thin profiles. The even older Baymeade, Goldsboro, and Rains soils formed on nearly level to gently sloping uplands. They have well developed horizons and thick profiles.

Some of the differences in the soils also reflect changes in relief because of geologic or natural erosion. The Baymeade, Goldsboro, and Rains soils formed on relatively stable, nearly level to gently sloping uplands. They have well developed horizons and thick profiles. Marvyn soils formed on less stable, steeper side slopes on uplands. They, too, have well developed horizons but have thin profiles due to higher rates of natural erosion.

Plant and Animal Life

Plants and animals determine the kinds of organic matter formed and the way they are incorporated into the soil. Organic matter is the primary nutrient and energy reservoir in many soils. Plants and micro-organisms release organic and inorganic compounds that influence the chemical breakdown of minerals into the soil. Plants take up nutrients from the lower horizons and deposit them on the surface when foliage dies. Plant roots increase soil structure and porosity. Plant roots physically hold soil in place, and plant foliage protects the soil surface, both of which minimize erosion by wind and water.

Animals and insects transfer soil particles from one horizon to another. Earthworms and microorganisms aid the chemical breakdown of minerals and improve soil structure and porosity by their activities.

Parent Material

Parent material is an important factor in the formation of the different soils in Brunswick County. It has caused differences in the thickness and texture of horizons, mineralogy, and the overall chemistry of the soil.

Although geologically related, the various parent materials differ in mineral, chemical, and particle-size composition.

Most of the soils formed in sediment of the Wicomico and Talbot geomorphic surfaces that cover most of the county. The sediment consists of old marine sediment, alluvium recently deposited in drainageways, and organic material that accumulated on the broad interstream areas.

The Wicomico and Talbot surfaces contain loamy and sandy sediment and deposits of organic parent material. Goldsboro, Lynchburg, and Rains soils formed in parent material consisting of nearly equal amounts of sand, silt, and clay. Foreston, Woodington, and Torhunta soils formed in parent material that has large amounts of sand. Kureb, Leon, and Murville soils formed in parent material consisting of nearly all sand. Croatan and Dorovan soils formed in thick organic materials.

The rest of the soils in the county formed on the Pamlico geomorphic surface, which covers the southern edge of the county. The sediment consists mainly of sandy deposits as continuous sand ridges and sediment of sand, silt, clay, and organic material deposited in flood plains and marsh environments. In many places the parent material is being actively manipulated by wind and wave action or flooded by tides.

The Pamlico surface contains sandy and clayey sediment and thick deposits of organic material. Wando, Newhan, and Corolla soils formed in parent material consisting of mostly sand. Bohicket soil formed in clayey parent material. Lafitte soil formed in thick organic material. Bohicket, Carteret, and Lafitte soils formed in tidal marsh environments that have high salt contents. This resulted in these soils having basic reactions (moderately high pH), high base saturation, and mixed mineralogies. Grifton soil formed in parent material containing marl, resulting in a high pH and high base saturation.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse textured soil. Sand or loamy sand.

Complex, soil. A map map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fast intake (in tables). The rapid movement of water into the soil.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers of lower case letter that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:
O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil).

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002

millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be consequence in interpreting their use and behavior.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-79 at Southport, North Carolina]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	55.2	35.2	45.2	72	15	67	4.27	2.23	6.05	7	.0
February---	57.4	37.2	47.3	75	15	80	3.91	2.02	5.56	7	.5
March------	63.4	43.5	53.5	80	25	171	4.28	2.42	5.91	7	.1
April------	71.9	52.3	62.1	85	34	363	2.78	.99	4.25	5	.0
May--------	78.7	61.1	69.6	92	42	617	3.98	2.09	5.62	7	.0
June-------	84.2	68.1	76.2	95	52	786	4.94	2.04	7.39	7	.0
July-------	87.0	72.1	79.5	95	61	918	6.36	3.08	9.19	8	.0
August-----	87.0	71.4	79.2	95	60	90	6.82	3.57	9.66	9	.0
September--	82.9	66.3	74.6	91	51	738	6.93	3.74	9.73	8	.0
October----	74.9	54.8	64.9	87	34	462	3.49	1.08	5.45	5	.0
November---	66.6	45.6	56.1	81	25	205	3.12	1.42	4.58	5	.0
December---	58.7	38.4	48.6	74	16	99	3.93	1.92	5.66	7	.0
Yearly:											
Average--	72.3	53.8	63.1	---	---	---	---	---	---	---	---
Extreme--	---	---	---	97	13	---	---	---	---	---	---
Total----	---	---	---	---	---	5,411	54.81	47.04	63.38	82	.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 °F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-79
at Southport, North Carolina]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 16	April 9	April 11
2 years in 10 later than--	March 7	March 29	April 3
5 years in 10 later than--	February 16	March 7	March 20
First freezing temperature in fall:			
1 year in 10 earlier than--	November 14	November 5	October 28
2 years in 10 earlier than--	November 25	November 13	November 2
5 years in 10 earlier than--	December 15	November 28	November 13

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-79
at Southport, North Carolina]

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	255	221	207
8 years in 10	269	236	218
5 years in 10	298	265	237
2 years in 10	336	294	257
1 year in 10	>365	309	267

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
BaB	Baymeade fine sand, 1 to 6 percent slopes	55,973	10.2
BDC	Baymeade and Marvyn soils, 6 to 12 percent slopes	7,762	1.4
BnB	Blanton fine sand, 0 to 5 percent slopes	16,127	2.9
BO	Bohicket silty clay loam	13,427	2.5
BrB	Bragg fine sandy loam, 2 to 6 percent slopes	2,165	0.4
CA	Carteret loamy fine sand	1,085	0.2
CH	Chowan silt loam	5,033	0.9
Co	Corolla fine sand	989	0.2
CT	Croatan muck	29,703	5.4
DO	Dorovan muck	16,717	3.0
Du	Duckston fine sand	311	0.1
Fo	Foreston loamy fine sand	26,692	4.9
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes	29,830	5.4
Gt	Grifton fine sandy loam	3,533	0.6
Jo	Johns fine sandy loam	3,116	0.6
KrB	Kureb fine sand, 1 to 8 percent slopes	16,573	3.0
LA	Lafitte muck	1,415	0.3
Lo	Leon fine sand, 0 to 2 percent slopes	45,611	8.3
Lu	Lumbee fine sandy loam	4,127	0.7
Ly	Lynchburg fine sandy loam	22,023	4.0
Ma	Mandarin fine sand	15,415	2.8
Mk	Muckalee loam	28,444	5.2
Mu	Murville mucky fine sand	39,490	7.2
NeE	Newhan fine sand, 2 to 30 percent slopes	4,415	0.8
NhE	Newhan fine sand, dredged, 2 to 30 percent slopes	3,510	0.6
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes	12,521	2.3
On	Onslow fine sandy loam	3,439	0.6
PaA	Pactolus fine sand, 0 to 2 percent slopes	3,994	0.7
Pn	Pantego mucky loam	12,176	2.2
Pt	Pits	818	0.1
Ra	Rains fine sandy loam	19,991	3.6
Tm	Tomahawk loamy fine sand	4,975	0.9
To	Torhunta mucky fine sandy loam	47,771	8.7
Ur	Urban land	740	0.1
WaB	Wando fine sand, 0 to 6 percent slopes	8,305	1.5
WdB	Wando-Urban land complex, 0 to 6 percent slopes	634	0.1
Wo	Woodington fine sandy loam	35,619	6.5
YaB	Yaupon silty clay loam, 0 to 3 percent slopes	3,012	0.5
	Water	3,232	0.6
	Total	550,713	100.0

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Oats	Grass hay	Grass-clover
		Bu	Bu	Lbs	Bu	Bu	Tons	AUM*
BaB---- Baymeade	IIIs	69	37	2,500	50	60	4.5	---
BDC:								
Baymeade----	IIIs	60	27	2,500	50	60	4.5	---
Marvyn----	IIIe	60	35	---	---	---	5.1	8.0
BnB---- Blanton	IIIs	69	25	2,000	50	60	4.5	8.0
BO---- Bohicket	VIIIw	---	---	---	---	---	---	---
BrB---- Bragg	IIIe	---	---	---	---	---	---	---
CA---- Carteret	VIIIw	---	---	---	---	---	---	---
CH---- Chowan	VIIw	---	---	---	---	---	---	---
Co---- Corolla	VIIw	---	---	---	---	---	---	---
CT**---- Croatan	IVw	117	34	---	43	60	---	7.5
DO---- Dorovan	VIIw	---	---	---	---	---	---	---
Du---- Duckston	VIIw	---	---	---	---	---	---	---
Fo---- Foreston	IIw	115	35	2,600	60	70	4.5	8.5
GoA---- Goldsboro	IIw	125	40	3,000	60	---	---	11.5
Gt**---- Grifton	IIIw	110	40	---	50	60	---	11.5
Jo---- Johns	IIw	120	40	2,500	50	60	---	9.0
KrB---- Kureb	VIIs	---	---	---	---	---	4.0	---
La---- Lafitte	VIIIw	---	---	---	---	---	---	---
Lo---- Leon	IVw	50	20	---	---	---	3.5	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Oats	Grass hay	Grass-clover
		Bu	Bu	Lbs	Bu	Bu	Tons	AUM*
Lu**---------- Lumbee	IIIw	110	40	---	50	60	---	10.0
Ly---------- Lynchburg	IIw	120	45	2,800	60	75	---	11.5
Ma---------- Mandarin	VIs	---	---	---	---	---	3.5	---
Mk---------- Muckalee	Vw	---	---	---	---	---	---	---
Mu---------- Murville	Vw	---	---	---	---	---	---	---
NeE, NhE-------- Newhan	VIIIs	---	---	---	---	---	---	---
NoB---------- Norfolk	IIe	100	35	2,800	55	70	5.0	---
On---------- Onslow	IIw	115	40	2,700	55	70	4.5	---
PaA---------- Pactolus	IIIs	65	25	1,800	---	---	4.5	---
Pn**---------- Pantego	IIIw	120	35	---	50	70	---	11.0
Pt. Pits								
Ra---------- Rains	IIIw	120	40	2,300	50	70	---	11.0
Tm---------- Tomahawk	IIw	86	28	2,400	50	70	4.8	9.0
To**---------- Torhunta	IIIw	120	34	---	50	70	---	11.0
Ur. Urban land								
WaB---------- Wando	IIIs	55	20	---	---	---	4.0	---
WdB. Wando-Urban land								
Wo**---------- Woodington	IIIw	100	35	---	50	70	---	10.0
YaB---------- Yaupon	IVe	---	---	---	---	---	---	10.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** Land capability and yield data shown are for drained conditions; much of the existing acreage is undrained and has no yield data.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	---	---	---	---
II	102,596	12,521	90,075	---
III	114,317	5,270	19,991	89,056
IV	48,623	3,012	45,611	---
V	67,934	---	67,934	---
VI	118,641	---	103,226	15,415
VII	69,326	---	52,753	16,573
VIII	23,852	---	15,927	7,925

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
BaB---------- Baymeade	3s	Slight	Moderate	Moderate	Loblolly pine-------	---	Loblolly pine, longleaf pine.
					Longleaf pine-------	65	
BDC:							
Baymeade----------	3s	Slight	Moderate	Moderate	Loblolly pine-------	---	Loblolly pine, longleaf pine.
					Longleaf pine-------	65	
Marvyn----------	2o	Slight	Slight	Slight	Loblolly pine-------	90	Loblolly pine.
					Shortleaf pine------	80	
					Longleaf pine-------	80	
BnB---------- Blanton	3s	Slight	Moderate	Moderate	Loblolly pine-------	80	Loblolly pine.
					Longleaf pine-------	70	
					Bluejack oak--------	---	
					Turkey oak----------	---	
					Southern red oak----	---	
					Live oak------------	---	
BrB---------- Bragg	4s	Slight	Slight	Moderate	Loblolly pine-------	---	Longleaf pine, loblolly pine.
					Longleaf pine-------	---	
CH---------- Chowan	2w	Slight	Severe	Severe	Water tupelo--------	80	Baldcypress, green ash.
					Green ash-----------	98	
					Baldcypress---------	---	
					Red maple-----------	---	
					Sweetgum------------	---	
					Pond pine-----------	---	
					Atlantic white-cedar	---	
CT---------- Croatan	4w	Slight	Severe	Severe	Pond pine-----------	55	Loblolly pine.
					Water tupelo--------	60	
					Baldcypress---------	---	
					Loblolly pine-------	70	
					Sweetgum------------	---	
					Swamp tupelo--------	---	
					Atlantic white-cedar	---	
DO---------- Dorovan	4w	Slight	Severe	Severe	Blackgum------------	70	Baldcypress.
					Sweetbay------------	---	
Fo---------- Foreston	2w	Slight	Moderate	Slight	Loblolly pine-------	90	Loblolly pine.
					Longleaf pine-------	75	
GoA---------- Goldsboro	2w	Slight	Moderate	Slight	Loblolly pine-------	90	Loblolly pine, yellow-poplar, American sycamore, sweetgum.
					Longleaf pine-------	77	
					Sweetgum------------	90	
					Southern red oak----	---	
					White oak-----------	---	
Gt---------- Grifton	2w	Slight	Severe	Severe	Loblolly pine-------	89	Loblolly pine, sweetgum, water tupelo, American sycamore, water oak.
Jo---------- Johns	2w	Slight	Moderate	Slight	Loblolly pine-------	86	Loblolly pine.
					Sweetgum------------	90	

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
KrB---------- Kureb	5s	Slight	Severe	Severe	Longleaf pine-------	52	Longleaf pine.
					Sand pine----------	---	
Lo---------- Leon	4w	Slight	Moderate	Moderate	Longleaf pine-------	70	Loblolly pine.
					Longleaf pine-------	65	
Lu---------- Lumbee	2w	Slight	Severe	Severe	Loblolly pine-------	94	Loblolly pine, water tupelo, sweetgum.
					Pond pine----------	---	
					Water tupelo--------	---	
					Sweetgum-----------	---	
					White oak----------	---	
Ly---------- Lynchburg	2w	Slight	Moderate	Slight	Loblolly pine-------	86	Loblolly pine, American sycamore, sweetgum.
					Longleaf pine-------	74	
					Yellow-poplar-------	92	
					Sweetgum-----------	90	
					Southern red oak----	---	
					White oak----------	---	
					Blackgum-----------	---	
Ma---------- Mandarin	4s	Slight	Moderate	Severe	Longleaf pine-------	60	Longleaf pine.
Mk---------- Muckalee	2w	Slight	Severe	Severe	Sweetgum-----------	90	Sweetgum, loblolly pine, American sycamore, eastern cottonwood, Nuttall oak.
					Loblolly pine-------	90	
					Water oak----------	90	
					Green ash----------	85	
					Eastern cottonwood--	100	
Mu---------- Murville	2w	Slight	Severe	Severe	Loblolly pine-------	90	Loblolly pine.
NoB---------- Norfolk	2o	Slight	Slight	Slight	Loblolly pine-------	86	Loblolly pine.
					Longleaf pine-------	68	
On---------- Onslow	3o	Slight	Slight	Slight	Loblolly pine-------	76	Loblolly pine.
					Longleaf pine-------	67	
PaA---------- Pactolus	3w	Slight	Moderate	Moderate	Loblolly pine-------	84	Loblolly pine.
					Longleaf pine-------	70	
Pn---------- Pantego	1w	Slight	Severe	Severe	Loblolly pine-------	98	Loblolly pine, sweetgum, American sycamore, water tupelo.
					Pond pine----------	73	
					Baldcypress---------	---	
					Water tupelo--------	---	
					Water oak----------	---	
Ra---------- Rains	2w	Slight	Severe	Severe	Loblolly pine-------	94	Loblolly pine, sweetgum, American sycamore.
					Sweetgum-----------	90	
Tm---------- Tomahawk	3w	Slight	Moderate	Moderate	Loblolly pine-------	80	Loblolly pine, longleaf pine.
					Longleaf pine-------	70	
To---------- Torhunta	2w	Slight	Severe	Severe	Loblolly pine-------	90	Loblolly pine, sweetgum, American sycamore, Shumard oak.
					Sweetgum-----------	90	
					Water tupelo--------	---	

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
WaB---------- Wando	3s	Slight	Moderate	Moderate	Longleaf pine-------	70	Loblolly pine, longleaf pine.
					Loblolly pine-------	80	
					Live oak----------	---	
					Sweetgum----------	---	
					Southern red oak----	---	
					Shumard oak---------	---	
					Post oak----------	---	
					Blackjack oak-------	---	
WdB:							
Wando----------	3s	Slight	Moderate	Moderate	Longleaf pine-------	70	Loblolly pine, longleaf pine.
					Loblolly pine-------	80	
					Live oak----------	---	
					Sweetgum----------	---	
					Southern red oak----	---	
					Shumard oak---------	---	
					Post oak----------	---	
					Blackjack oak-------	---	
Urban land.							
Wo---------- Woodington	3w	Slight	Severe	Severe	Loblolly pine-------	83	Loblolly pine, American sycamore, water tupelo, water oak, sweetgum.
					Sweetgum----------	---	
					White oak----------	---	
					Southern red oak----	---	
					Water tupelo--------	---	
YaB---------- Yaupon	3w	Slight	Moderate	Slight	Loblolly pine-------	---	Loblolly pine, longleaf pine.
					Longleaf pine-------	---	
					Water oak----------	---	
					Sweetgum----------	---	

TABLE 8.--SITE INDEX VALUES

Indicator Forest Type or Species	Very High	High	Moderately High	Moderate	Low
	Site Index				
Cottonwood	106+	96-105	86-95	76-85	75-
Yellow-poplar	106+	96-105	86-95	76-85	75-
Sweetgum	96+	86-95	76-85	66-75	65-
Water oak	96+	86-95	76-85	66-75	65-
Slash pine	96+	86-95	76-85	66-75	65-
Loblolly pine	96+	86-95	76-85	66-75	65-
Southern red oak	86+	76-85	66-75	56-65	55-
Eastern redcedar	66+	56-65	46-55	35-45	35-

TABLE 9.--WOODLAND GROWTH PER ACRE

[Potential average yearly growth per acre is shown in Board Feet International (1/8-inch rule) for a fully stocked stand of Loblolly pine 7 inches diameter breast high and over]

Age in years	Site index in feet						
	60	70	80	90	100	110	120
	Growth (in broad feet)						
15		3	10	57	120	200	307
20		75	150	250	375	500	650
25	80	180	300	440	580	740	940
30	150	283	417	567	733	917	1,100
35	200	357	500	657	829	1,029	1,229
40	250	400	550	712	888	1,075	1,288
45	278	433	578	744	911	1,100	1,300
50	300	440	590	750	910	1,090	1,290
55	318	445	591	736	900	1,073	1,255
60	317	442	575	717	875	1,050	1,217
65	315	438	562	692	846	1,015	1,777
70	314	421	543	671	814	971	1,136
75	307	413	527	647	787	933	1,087
80	300	400	506	625	756	894	1,044

TABLE 10.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BaB Baymeade	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
BDC: Baymeade	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Marvyn	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
BnB Blanton	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
BO Bohicket	Severe: flooding, ponding, percs slowly.	Severe: ponding, excess salt.	Severe: ponding, flooding.	Severe: ponding.	Severe: excess salt, excess sulfur, ponding.
BrB Bragg	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
CA Carteret	Severe: flooding, ponding.	Severe: ponding, excess salt.	Severe: ponding, flooding.	Severe: ponding.	Severe: excess salt, ponding.
CH Chowan	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Co Corolla	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
CT Croatan	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, too acid.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: too acid, wetness.
DO Dorovan	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
Du Duckston	Severe: flooding, wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
Fo Foreston	Slight	Slight	Slight	Slight	Moderate: droughty.
GoA Goldsboro	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
Gt Grifton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Jo--- Johns	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
KrB--- Kureb	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
LA--- Lafitte	Severe: flooding, excess humus.	Severe: excess humus, excess salt.	Severe: excess humus.	Severe: excess humus.	Severe: excess salt, ponding.
Lo--- Leon	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Lu--- Lumbee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ly--- Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ma--- Mandarin	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Mk--- Muckalee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Mu--- Murville	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
NeE, NhE--- Newhan	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty, slope.
NoB--- Norfolk	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
On--- Onslow	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
PaA--- Pactolus	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Pn--- Pantego	Severe: flooding, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness.
Pt. Pits					
Ra--- Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Tm--- Tomahawk	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
To---------- Torhunta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ur. Urban land					
WaB---------- Wando	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
WdB: Wando----------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
Urban land.					
Wo---------- Woodington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
YaB---------- Yaupon	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Slight.

TABLE 11.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
BaB---- Baymeade	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
BDC:										
Baymeade----	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Marvyn----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BnB---- Blanton	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BO---- Bohicket	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Fair.
BrB---- Bragg	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CA---- Carteret	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Fair.
CH---- Chowan	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Co---- Corolla	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
CT---- Croatan	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
DO---- Dorovan	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Du---- Duckston	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Fo---- Foreston	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GoA---- Goldsboro	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Gt---- Grifton	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Jo---- Johns	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KrB---- Kureb	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
La---- Lafitte	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Poor.
Lo---- Leon	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.

TABLE 11.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Lu---------- Lumbee	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Ly---------- Lynchburg	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ma---------- Mandarin	Very poor.	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
Mk---------- Muckalee	Poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair.
Mu---------- Murville	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
NeE, NhE---------- Newhan	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
NoB---------- Norfolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
On---------- Onslow	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
PaA---------- Pactolus	Fair	Fair	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pn---------- Pantego	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Pt. Pits										
Ra---------- Rains	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Tm---------- Tomahawk	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Good	Poor.
To---------- Torhunta	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ur. Urban land										
WaB---------- Wando	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
WdB: Wando----------	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Urban land.										
Wo---------- Woodington	Poor	Fair	Fair	Fair	Fair	Good	Poor	Fair	Fair	Fair.
YaB---------- Yaupon	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 12.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BaB---------- Baymeade	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
BDC: Baymeade---------	Severe: cutbanks cave.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
Marvyn----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
BnB---------- Blanton	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
BO---------- Bohicket	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
BrB---------- Bragg	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
CA---------- Carteret	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: excess salt, ponding, droughty.
CH---------- Chowan	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness, low strength.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Co---------- Corolla	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: flooding, wetness.	Severe: droughty.
CT---------- Croatan	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness, low strength.	Severe: too acid, wetness.
DO---------- Dorovan	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding, low strength.	Severe: ponding, flooding, excess humus.
Du---------- Duckston	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: droughty.
Fo---------- Foreston	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Moderate: droughty.
GoA---------- Goldsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Gt---------- Grifton	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Jo---------- Johns	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
KrB---------- Kureb	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
LA---------- Lafitte	Severe: excess humus.	Severe: flooding, low strength.	Severe: flooding.	Severe: flooding, low strength.	Severe: flooding, low strength.	Severe: excess salt.
Lo---------- Leon	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Lu---------- Lumbee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
Ly---------- Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ma---------- Mandarin	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
Mk---------- Muckalee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Mu---------- Murville	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
NeE, NhE---------- Newhan	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
NoB---------- Norfolk	Moderate: wetness.	Slight---------	Moderate: wetness.	Moderate: slope.	Slight---------	Slight.
On---------- Onslow	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
PaA---------- Pactolus	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
Pn---------- Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pt. Pits						
Ra---------- Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Tm---------- Tomahawk	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
To---------- Torhunta	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ur. Urban land						
WaB---------- Wando	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
WdB: Wando----------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
Urban land.						
Wo---------- Woodington	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
YaB---------- Yaupon	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.

TABLE 13.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BaB---------- Baymeade	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: too sandy.
BDC: Baymeade----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: too sandy.
Marvyn----------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: hard to pack, slope.
BnB---------- Blanton	Moderate: wetness.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: too sandy.
BO---------- Bohicket	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
BrB---------- Bragg	Severe: percs slowly.	Moderate: slope.	Slight----------	Slight----------	Good.
CA---------- Carteret	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, ponding.
CH---------- Chowan	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
Co---------- Corolla	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: wetness, seepage.	Severe: seepage, wetness.	Poor: seepage, too sandy.
CT---------- Croatan	Severe: wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: wetness, too acid.	Severe: seepage, wetness.	Poor: wetness, excess humus.
DO---------- Dorovan	Severe: flooding, ponding, poor filter.	Severe: flooding, excess humus, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding, excess humus.
Du---------- Duckston	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness, too sandy.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.

TABLE 13.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Fo Foreston	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: thin layer.
GoA Goldsboro	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Gt Grifton	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
Jo Johns	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
KrB Kureb	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
LA Lafitte	Severe: flooding.	Severe: seepage, flooding, excess humus.	Severe: flooding, excess humus.	Severe: flooding, seepage.	Poor: excess humus.
Lo Leon	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Lu Lumbee	Severe: wetness.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
Ly Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ma Mandarin	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: wetness, seepage.	Poor: seepage, too sandy.
Mk Muckalee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Mu Murville	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
NeE, NhE Newhan	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
NoB Norfolk	Moderate: wetness.	Moderate: seepage.	Slight	Slight	Slight.

TABLE 13.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
On Onslow	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
PaA Pactolus	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
Pn Pantego	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Pt. Pits					
Ra Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, seepage.	Poor: wetness.
Tm Tomahawk	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: seepage, wetness.	Poor: thin layer.
To Torhunta	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
Ur. Urban land					
WaB Wando	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
WdB: Wando	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
Wo Woodington	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
YaB Yaupon	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.

TABLE 14.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Topsoil
BaB---- Baymeade	Good	Probable	Poor: too sandy.
BDC: Baymeade----	Good	Probable	Poor: too sandy.
Marvyn----	Good	Improbable: excess fines.	Fair: too sandy, thin layer.
BnB---- Blanton	Good	Probable	Poor: too sandy.
BO---- Bohicket	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Poor: excess salt, wetness.
BrB---- Bragg	Good	Improbable: excess fines.	Fair: thin layer.
CA---- Carteret	Poor: wetness.	Probable	Poor: excess salt, wetness.
CH---- Chowan	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Co---- Corolla	Fair: wetness.	Probable	Poor: too sandy.
CT---- Croatan	Poor: wetness, excess humus, low strength.	Improbable: excess fines.	Poor: excess humus, wetness, too acid.
DO---- Dorovan	Poor: wetness, excess humus, low strength.	Improbable---- excess humus.	Poor: excess humus, wetness.
Du---- Duckston	Fair: wetness.	Probable	Poor: too sandy.
Fo---- Foreston	Fair: wetness.	Improbable: excess humus.	Fair. too sandy.
GoA---- Goldsboro	Fair: wetness.	Improbable: excess fines.	Good.
Gt---- Grifton	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Jo---- Johns	Fair: wetness.	Probable	Fair: thin layer.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Topsoil
KrB---- Kureb	Good----	Probable----	Poor: too sandy.
LA---- Lafitte	Poor: wetness, excess humus, low strength.	Improbable: excess fines, excess humus.	Poor: excess humus, excess salt, wetness.
Lo---- Leon	Poor: wetness.	Probable----	Poor: too sandy, wetness.
Lu---- Lumbee	Poor: wetness.	Probable----	Poor: wetness.
Ly---- Lynchburg	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Ma---- Mandarin	Fair: wetness.	Improbable: thin layer.	Poor: too sandy.
Mk---- Muckalee	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Mu---- Murville	Poor: wetness.	Probable----	Poor: too sandy, wetness.
NeE, NhE---- Newhan	Fair: slope.	Probable----	Poor: too sandy, slope.
NoB---- Norfolk	Good----	Improbable: excess fines.	Fair: too sandy.
On---- Onslow	Fair: wetness.	Improbable: excess fines.	Good.
PaA---- Pactolus	Fair: wetness.	Probable----	
Pn---- Pantego	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Pt. Pits			
Ra---- Rains	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Tm---- Tomahawk	Fair: wetness.	Probable----	Fair: too sandy.
To---- Torhunta	Poor: wetness.	Probable----	Poor: wetness.
Ur. Urban land			
WaB---- Wando	Good----	Probable----	Poor: too sandy.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Topsoil
WdB:			
Wando	Good	Probable	Poor: too sandy.
Urban land.			
Wo	Poor: wetness.	Probable	Poor: wetness.
Woodington			
YaB	Poor: low strength, shrink-swell.	Improbable: excess fines.	Poor: thin layer.
Yaupon			

TABLE 15.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
BaB---------- Baymeade	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, rooting depth.	Droughty, rooting depth.
BDC: Baymeade---------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, rooting depth.	Droughty, rooting depth.
Marvyn----------	Severe: slope.	Moderate: piping, hard to pack.	Severe: no water.	Deep to water	Fast intake, slope.	Slope.
BnB---------- Blanton	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
BO---------- Bohicket	Slight---------	Severe: hard to pack, ponding, excess salt.	Severe: slow refill, salty water.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Wetness, excess salt, percs slowly.
BrB---------- Bragg	Slight---------	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Favorable.
CA---------- Carteret	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: salty water, cutbanks cave.	Ponding, flooding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, excess salt, droughty.
CH---------- Chowan	Severe: seepage.	Severe: excess humus, wetness.	Severe: slow refill.	Flooding-------	Wetness, flooding.	Wetness.
Co---------- Corolla	Severe: seepage.	Severe: seepage, wetness, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
CT---------- Croatan	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, subsides.	Wetness, percs slowly.	Wetness, percs slowly.
DO---------- Dorovan	Moderate: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, flooding, subsides.	Ponding, flooding.	Wetness.
Du---------- Duckston	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
Fo---------- Foreston	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.

TABLE 15.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
GoA---- Goldsboro	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water.	Favorable----	Wetness----	Favorable.
Gt---- Grifton	Moderate: seepage.	Severe: wetness.	Slight----	Favorable----	Wetness----	Wetness.
Jo---- Johns	Severe: seepage.	Moderate: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness----	Favorable.
KrB---- Kureb	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Droughty.
LA---- Lafitte	Severe: seepage.	Severe: excess humus.	Severe: slow refill.	Ponding, flooding, subsides.	Ponding, flooding, excess salt.	Wetness, excess salt.
Lo---- Leon	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
Lu---- Lumbee	Severe: seepage.	Severe: wetness.	Slight----	Cutbanks cave	Wetness----	Wetness.
Ly---- Lynchburg	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable----	Wetness----	Wetness.
Ma---- Mandarin	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
Mk---- Muckalee	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, flooding.	Wetness, droughty.
Mu---- Murville	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, fast intake.	Wetness.
NeE, NhE---- Newhan	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Slope, droughty.
NoB---- Norfolk	Moderate: seepage.	Slight----	Severe: deep to water.	Deep to water	Slope----	Favorable.
On---- Onslow	Moderate: seepage.	Severe: piping, wetness.	Moderate: deep to water.	Favorable----	Wetness----	Favorable.
PaA---- Pactolus	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
Pn---- Pantego	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Favorable----	Wetness----	Wetness.

TABLE 15.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
Pt. Pits						
Ra---------- Rains	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable------	Wetness--------	Wetness.
Tm---------- Tomahawk	Severe: seepage.	Severe: piping, wetness, seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
To---------- Torhunta	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness--------	Wetness.
Ur. Urban land						
WaB---------- Wando	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
WdB: Wando----------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
Urban land.						
Wo---------- Woodington	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness--------	Wetness.
YaB---------- Yaupon	Slight---------	Moderate: hard to pack, wetness.	Severe: slow refill.	Wetness, percs slowly.	Percs slowly---	Percs slowly.

TABLE 16.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
BaB---------- Baymeade	0-23	Fine sand--------	SM, SP-SM	A-2, A-3	100	100	51-100	5-20	---	NP
	23-54	Fine sandy loam, sandy clay loam, sandy loam.	SC, SM, SM-SC	A-2, A-4	100	100	60-90	30-49	<25	NP-10
	54-80	Loamy fine sand, sand, loamy sand.	SM, SP-SM	A-2, A-3	100	100	51-75	5-30	---	NP
BDC:										
Baymeade--------	0-23	Fine sand--------	SM, SP-SM	A-2, A-3	100	100	51-100	5-20	---	NP
	23-54	Fine sandy loam, sandy clay loam, sandy loam.	SC, SM, SM-SC	A-2, A-4	100	100	60-90	30-49	<25	NP-10
	54-80	Loamy fine sand, sand, loamy sand.	SM, SP-SM	A-2, A-3	100	100	51-75	5-30	---	NP
Marvyn----------	0-16	Loamy sand-------	SM	A-2	95-100	90-100	50-80	13-30	---	NP
	16-31	Sandy clay loam, sandy loam.	ML, SC, SM-SC, SM	A-4, A-2 A-6, A-7	95-100	90-100	60-80	30-55	24-45	3-15
	31-45	Sandy clay loam, sandy clay.	ML, MH, SM	A-4, A-5, A-7	95-100	90-100	65-80	36-60	38-59	4-19
	45-80	Loamy sand, sandy loam, sandy clay loam.	SM, SC, ML CL	A-1, A-2, A-4	95-100	90-100	45-85	20-55	<40	NP-10
BnB---------- Blanton	0-48	Fine sand--------	SP-SM	A-3, A-2-4	100	100	65-100	5-12	---	NP
	48-80	Sandy loam, loamy sand, loamy coarse sand.	SM	A-2-4	100	100	65-96	13-30	<25	NP-3
BO---------- Bohicket	0-15	Silty clay loam	CH, MH	A-7	100	99-100	90-100	80-100	60-100	15-60
	15-70	Silty clay, clay, sandy clay.	CH, MH	A-7	100	99-100	80-100	70-95	50-100	16-60
BrB---------- Bragg	0-10	Fine sandy loam	SM	A-2, A-4	98-100	95-100	50-80	13-40	<20	NP-4
	10-63	Stratified sandy loam to clay loam.	SM, SM-SC, SC, CL	A-2, A-4, A-6, A-7-6	95-100	90-100	50-95	25-65	11-49	3-25
	63-70	Sandy loam, sandy clay loam, sandy clay.	SM, SC, ML CL	A-4, A-6	95-100	95-100	60-95	39-60	15-40	3-18
	70-75	Variable---------	---	---	---	---	---	---	---	---
CA---------- Carteret	0-80	Loamy fine sand	SM, SP-SM	A-2, A-3	95-100	90-100	50-75	5-25	---	NP
CH---------- Chowan	0-4	Silt loam--------	CL-ML, ML, MH	A-7-5, A-4 A-6	100	100	90-100	85-95	22-60	4-24
	4-34	Loam, silt loam, silty clay loam.	CL, MH, ML	A-7-5, A-4 A-6	100	100	90-100	85-96	22-62	6-30
	34-80	Sapric material	PT	---	---	---	---	---	---	NP
Co---------- Corolla	0-80	Fine sand--------	SW, SP-SM, SP	A-2, A-3	100	98-100	60-75	3-12	---	NP

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
CT	0-39	Muck	PT	---	---	---	---	---	---	---
Croatan	39-63	Sandy loam, fine sandy loam, mucky sandy loam.	SM, SC, SM-SC	A-2, A-4	100	100	60-85	25-49	<30	NP-10
	63-80	Loam, clay loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	100	100	75-100	36-95	<36	NP-15
DO	0-99	Muck	PT	---	---	---	---	---	---	---
Dorovan										
Du	0-80	Fine sand	SP-SM, SP	A-3	100	95-100	60-75	3-12	---	NP
Duckston										
Fo	0-12	Loamy fine sand	SM	A-2	100	100	60-100	15-36	---	NP
Foreston	12-78	Sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	100	100	70-100	18-40	<25	NP-5
	78-85	Loamy fine sand, loamy sand, fine sand.	SP-SM, SM	A-2, A-3	100	100	50-98	6-25	---	NP
GoA	0-8	Fine sandy loam	SM, SM-SC, SC	A-2, A-4, A-6	95-100	95-100	50-100	15-45	<25	NP-14
Goldsboro	8-70	Sandy clay loam, sandy loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	98-100	95-100	60-100	25-55	16-37	4-18
	70-80	Variable	---	---	---	---	---	---	---	---
Gt	0-17	Fine sandy loam	SM, SM-SC	A-2, A-4	100	95-100	60-100	20-45	<30	NP-7
Grifton	17-60	Sandy loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6	98-100	95-100	60-100	31-60	20-35	8-15
	60-80	Variable	---	---	---	---	---	---	---	---
Jo	0-13	Fine sandy loam	SM, SM-SC, SC	A-2, A-4	100	95-100	70-98	20-49	<30	NP-10
Johns	13-38	Sandy clay loam, sandy loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6, A-7	100	95-100	60-98	30-65	20-45	5-25
	38-70	Sand, loamy sand	SM, SP-SM, SP	A-2, A-3	95-100	95-100	51-90	4-25	---	NP
KrB	0-80	Fine sand	SP, SP-SM	A-3	100	100	60-100	0-7	---	NP
Kureb										
LA	0-55	Muck	PT	A-8	---	---	---	---	---	---
Lafitte	55-72	Clay, silty clay, silty clay loam.	MH, CH, ML CL	A-7-5, A-7-6	100	100	90-100	80-100	45-100	16-60
Lo	0-80	Fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-100	2-12	---	NP
Leon										
Lu	0-18	Fine sandy loam	SM, SM-SC	A-2, A-4	100	85-100	65-98	15-45	<20	NP-7
Lumbee	18-38	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-4, A-6, A-7	100	90-100	65-98	36-60	19-45	7-25
	38-80	Loamy sand, sand, fine sand.	SP, SM, SP-SM	A-2, A-3	90-100	85-100	50-90	4-25	---	NP

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Ly---------- Lynchburg	0-16	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-2, A-4	92-100	90-100	75-100	25-55	<30	NP-7
	16-80	Sandy clay loam, sandy loam, clay loam.	SM-SC, SC, CL, CL-ML	A-2, A-4, A-6	92-100	90-100	70-100	25-67	15-40	4-18
Ma---------- Mandarin	0-18	Fine sand--------	SP, SP-SM, SW-SM	A-3	100	100	90-100	2-10	---	NP
	8-35	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	90-100	5-15	---	NP
	35-62	Fine sand, sand	SP, SP-SM	A-3	100	100	90-100	2-7	---	NP
	62-80	Fine sand, sand	SP, SP-SM	A-3, A-2-4	100	100	90-100	3-12	---	NP
Mk---------- Muckalee	0-6	Loam----------	ML, SC, SM SM-SC	A-2, A-4	95-100	90-100	50-95	30-60	<30	NP-10
	6-65	Sandy loam, loamy sand.	SM	A-2, A-4	95-100	80-100	60-90	20-40	<20	NP-4
Mu---------- Murville	0-5	Mucky fine sand	SP-SM, SM	A-2, A-3	100	100	85-100	5-30	---	NP
	5-80	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2	100	100	85-100	5-20	---	NP
NeE, NhE---------- Newhan	0-80	Fine sand--------	SP, SP-SM	A-3	95-100	95-100	60-75	0-5	---	NP
NoB---------- Norfolk	0-16	Loamy fine sand	SM	A-2	95-100	92-100	50-95	13-30	<20	NP
	16-63	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	95-100	91-100	70-96	30-63	20-38	4-15
	63-80	Variable---------	---	---	---	---	---	---	---	---
On---------- Onslow	0-22	Fine sandy loam	SM, ML, SC CL	A-2, A-4	100	95-100	70-99	30-55	<25	NP-10
	22-65	Sandy clay loam, sandy loam, clay loam.	SM, CL, SM-SC, SC	A-2, A-4, A-6	100	95-100	60-98	30-60	<30	NP-14
	65-80	Variable---------	---	---	---	---	---	---	---	---
PaA---------- Pactolus	0-55	Fine sand--------	SM, SP-SM	A-2, A-3	100	90-100	51-100	6-30	---	NP
	55-80	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-2, A-3	100	90-100	51-100	5-30	---	NP
Pn---------- Pantego	0-11	Mucky loam-------	OL, SM, ML SM-SC	A-2, A-4	100	95-100	60-95	25-75	<35	NP-10
	11-15	Sandy clay loam, sandy loam, clay loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2	100	95-100	80-100	30-80	20-40	4-16
	15-80	Clay loam, sandy clay, sandy clay loam.	CL, SC	A-6, A-7	100	95-100	90-100	36-80	25-49	11-24
Pt. Pits										
Ra---------- Rains	0-15	Fine sandy loam	SM, ML	A-2, A-4	100	95-100	50-85	25-56	<35	NP-10
	15-72	Sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	100	95-100	55-98	30-70	18-40	4-20
	72-80	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7	100	98-100	60-98	36-72	18-45	4-28

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Tm---------- Tomahawk	0-12	Loamy fine sand	SM, SP-SM	A-2-4, A-1-B	100	95-100	40-70	10-30	---	NP
	12-23	Sandy loam, fine sandy loam.	SM, SC, SM-SC	A-2-4, A-4	100	95-100	50-80	20-49	<25	NP-10
	23-80	Fine sand, sand, loamy sand.	SM, SP-SM	A-2-4, A-1-B, A-3	100	95-100	35-65	5-20	---	NP
To---------- Torhunta	0-11	Mucky fine sandy loam.	SM	A-2-4, A-4	100	95-100	70-85	20-49	<25	NP-4
	11-50	Sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	100	95-100	70-92	20-40	<25	NP-7
	50-80	Loamy sand, sand, sandy loam.	SM, SP-SM, SM-SC	A-2, A-3	100	95-100	65-92	5-35	<25	NP-4
Ur. Urban land										
WaB---------- Wando	0-55	Fine sand--------	SP-SM, SM	A-2, A-3	96-100	95-100	60-98	5-25	---	NP
	55-99	Sand, fine sand	SP, SP-SM, SM	A-2, A-3	98-100	98-100	51-98	2-20	---	NP
WdB: Wando----------	0-55	Fine sand--------	SP-SM, SM	A-2, A-3	96-100	95-100	60-98	5-25	---	NP
	55-99	Sand, fine sand	SP, SP-SM, SM	A-2, A-3	98-100	98-100	51-98	2-20	---	NP
Urban land.										
Wo---------- Woodington	0-14	Fine sandy loam	SM	A-2, A-4	100	95-100	50-100	20-50	<25	NP-3
	14-55	Sandy loam, fine sandy loam.	SM	A-2, A-4	100	95-100	50-100	20-50	<25	NP-3
	55-80	Sandy loam, loamy sand, loamy fine sand.	SM, SP-SM	A-2, A-4	100	95-100	50-100	10-50	<25	NP-3
YaB---------- Yaupon	0-7	Silty clay loam	ML, CL, SC	A-4, A-6	100	90-100	70-100	50-90	<35	NP-15
	7-76	Silty clay, clay, sandy clay.	CL, CH	A-7	100	90-100	85-100	51-90	41-60	15-30

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cm	In/hr	In/in	pH	mmhos/cm				Pct
BaB----------	0-23	0-8	1.60-1.75	6.0-20	0.02-0.06	4.5-6.5	<2	Low----------	0.10	5	.5-1
Baymeade	23-54	8-26	1.45-1.60	2.0-6.0	0.10-0.14	4.5-6.5	<2	Low----------	0.10		
	54-80	0-12	1.60-1.75	6.0-20	0.02-0.10	4.5-6.5	<2	Low----------	0.10		
BDC:											
Baymeade--------	0-23	0-8	1.60-1.75	6.0-20	0.02-0.06	4.5-6.5	<2	Low----------	0.10	5	.5-1
	23-54	8-26	1.45-1.60	2.0-6.0	0.10-0.14	4.5-6.5	<2	Low----------	0.10		
	54-80	0-12	1.60-1.75	6.0-20	0.02-0.10	4.5-6.5	<2	Low----------	0.10		
Marvyn----------	0-16	2-17	1.35-1.70	2.0-6.0	0.06-0.11	4.5-6.0	<2	Low----------	0.17	4	<2
	16-31	18-35	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	<2	Low----------	0.32		
	31-45	25-45	1.40-1.60	0.6-2.0	0.11-0.16	4.5-6.0	<2	Low----------	0.32		
	45-80	10-30	1.40-1.60	0.2-2.0	0.07-0.14	4.5-6.0	<2	Low----------	0.32		
BnB----------	0-48	1-7	1.30-1.60	6.0-20	0.03-0.07	4.5-6.0	<2	Low----------	0.10	5	.5-1
Blanton	48-80	10-18	1.53-1.65	2.0-6.0	0.10-0.15	4.5-5.5	<2	Low----------	0.15		
BO----------	0-15	30-60	1.20-1.40	0.06-0.2	0.02-0.06	6.1-8.4	4-8	High---------	0.28	5	5-25
Bohicket	15-70	35-60	1.30-1.60	<0.06	0.02-0.06	6.1-8.4	4-8	High---------	0.24		
BrB----------	0-10	5-25	1.50-1.70	2.0-6.0	0.06-0.12	4.5-5.5	<2	Low----------	0.20	5	0-2
Bragg	10-63	18-35	1.40-1.70	0.2-0.6	0.10-0.15	4.5-6.0	<2	Low----------	0.28		
	63-70	15-45	1.30-1.60	0.2-0.6	0.10-0.15	4.5-7.3	<2	Low----------	0.28		
	70-75	---	---	---	---	---	---	----------	----		
CA----------	0-80	2-8	1.45-1.60	>6.0	0.02-0.10	5.6-8.4	>16	Low----------	0.15	5	.5-2
Carteret											
CH----------	0-4	5-25	1.20-1.40	2.0-6.0	0.15-0.20	3.6-6.0	<2	Low----------	0.32	4	2-4
Chowan	4-34	18-35	1.40-1.60	0.2-0.6	0.15-0.20	3.6-6.0	<2	Low----------	0.32		
	34-80	2-12	0.40-0.65	0.2-6.0	0.20-0.26	3.6-5.0	<2	Low----------	----		
Co----------	0-80	0-3	1.60-1.70	>20	0.01-0.03	5.6-7.8	<2	Low----------	0.10	5	<.5
Corolla											
CT----------	0-39	0.-0.	0.40-0.65	0.06-6.0	0.35-0.45	<4.5	<2	Low----------	----	---	25-60
Croatan	39-63	8-20	1.40-1.60	0.2-6.0	0.10-0.15	3.6-6.5	<2	Low----------	----		
	63-80	10-35	1.40-1.60	0.2-2.0	0.12-0.20	3.6-6.5	<2	Low----------	----		
DO----------	0-99	---	0.35-0.55	0.6-2.0	0.25-0.50	3.6-4.4	<2	----------	----	---	---
Dorovan											
Du----------	0-80	0-4	1.60-1.70	>20	0.02-0.05	3.6-8.4	<2	Low----------	0.10	5	.5-1
Duckston											
Fo----------	0-12	5-12	1.20-1.40	6.0-20	0.05-0.10	4.5-6.5	<2	Low----------	0.15	5	.5-2
Foreston	12-78	10-18	1.20-1.40	2.0-6.0	0.09-0.13	4.5-5.5	<2	Low----------	0.10		
	78-85	4-12	1.30-1.60	6.0-20	0.03-0.10	4.5-5.5	<2	Low----------	0.10		
GoA----------	0-8	5-15	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	<2	Low----------	0.20	5	.5-2
Goldsboro	8-70	18-30	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	<2	Low----------	0.24		
	70-80	---	---	---	---	---	---	----------	----		
Gt----------	0-17	7-18	1.45-1.65	2.0-6.0	0.10-0.14	4.5-6.5	<2	Low----------	0.20	5	2-4
Grifton	17-60	18-35	1.35-1.45	0.6-2.0	0.12-0.17	4.5-8.4	<2	Low----------	0.24		
	60-80	---	---	---	---	---	---	----------	----		

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cm	In/hr	In/in	pH	mmhos/cm				Pct
Jo	0-13	5-15	1.45-1.65	2.0-6.0	0.10-0.15	4.5-5.5	<2	Low	0.20	5	.5-2
Johns	13-38	18-35	1.40-1.60	0.6-2.0	0.12-0.15	4.5-5.5	<2	Low	0.24		
	38-70	2-10	1.60-1.75	6.0-20	0.03-0.06	4.5-5.5	<2	Low	0.10		
KrB	0-80	0-3	1.60-1.80	6.0-20	<0.05	4.5-7.3	<2	Low	0.10	5	<2
Kureb											
LA	0-55	---	0.05-0.50	2.0-6.0	0.20-0.50	3.6-8.4	4-8	Low	----	---	30-70
Lafitte	55-72	30-85	0.50-1.00	<0.06	0.15-0.20	6.1-8.4	8-16	High	0.32		
Lo	0-80	1-6	1.40-1.65	6.0-20	0.02-0.05	3.6-5.5	<2	Low	0.10	5	.5-4
Leon											
Lu	0-18	4-18	1.55-1.70	2.0-6.0	0.08-0.12	4.5-5.5	<2	Low	0.24	5	2-4
Lumbee	18-38	18-35	1.30-1.45	0.6-2.0	0.12-0.16	4.5-5.5	<2	Low	0.32		
	38-80	1-10	1.60-1.75	6.0-20	0.03-0.06	4.5-5.5	<2	Low	0.10		
Ly	0-16	5-20	1.30-1.60	2.0-6.0	0.09-0.13	3.6-5.5	<2	Low	0.20	5	.5-5
Lynchburg	16-80	18-35	1.30-1.50	0.6-2.0	0.12-0.16	3.6-5.5	<2	Low	0.20		
Ma	0-18	<3	1.35-1.65	6.0-20	0.03-0.07	3.6-6.0	---	Low	0.10	5	3
Mandarin	18-35	2-9	1.45-1.60	0.6-2.0	0.10-0.15	3.6-6.0	---	Low	0.15	---	---
	35-62	<3	1.35-1.45	0.6-20	0.03-0.07	4.5-7.3	---	Low	0.10	---	---
	62-80	2-9	1.45-1.60	0.6-20	0.10-0.15	4.5-7.3	---	Low	0.15	---	---
Mk	0-6	10-25	---	0.6-2.0	0.09-0.15	5.1-7.3	<2	Low	0.20	5	---
Muckalee	6-65	5-20	---	0.6-2.0	0.08-0.12	5.6-8.4	<2	Low	0.20		
Mu	0-5	2-8	1.20-1.40	6.0-20	0.15-0.20	3.6-5.5	<2	Low	0.10	5	9-20
Murville	5-80	2-8	1.60-1.75	2.0-6.0	0.05-0.09	3.6-5.5	<2	Low	0.10		
NeE, NhE	0-80	---	1.60-1.75	>20	<0.05	3.6-7.8	<2	Low	0.10	5	---
Newhan											
NoB	0-16	2-8	1.55-1.75	6.0-20	0.06-0.11	4.5-6.0	<2	Low	0.20	5	.5-2
Norfolk	16-63	18-35	1.35-1.45	0.6-2.0	0.10-0.15	4.5-5.5	<2	Low	0.24		
	63-80	---	---	---	---	---	---	---	---		
On	0-17	5-15	1.45-1.65	2.0-6.0	0.11-0.15	3.6-5.5	<2	Low	0.20	4	.5-2
Onslow	17-65	15-35	1.30-1.50	0.6-2.0	0.12-0.17	3.6-5.5	<2	Low	0.24		
	65-80	---	---	---	---	---	---	---	---		
PaA	0-55	2-12	1.60-1.75	6.0-20	0.05-0.10	4.5-6.0	<2	Low	0.10	5	.5-2
Pactolus	55-80	2-12	1.60-1.75	6.0-20	0.03-0.07	4.5-5.5	<2	Low	0.10		
Pn	0-11	5-15	1.20-1.40	2.0-6.0	0.20-0.30	3.6-5.5	<2	Low	0.10	5	10-15
Pantego	11-15	18-35	1.30-1.40	0.6-2.0	0.12-0.20	3.6-5.5	<2	Low	0.28		
	15-80	18-40	1.25-1.40	0.6-2.0	0.15-0.20	3.6-5.5	<2	Low	0.28		
Pt.											
Pits											
Ra	0-15	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.5	<2	Low	0.20	5	1-6
Rains	15-72	18-35	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	<2	Low	0.24		
	72-80	18-40	1.30-1.50	0.6-2.0	0.10-0.15	4.5-5.5	<2	Low	0.28		
Tm	0-12	2-8	1.60-1.75	6.0-20	0.04-0.10	4.5-5.5	<2	Low	0.10	5	.5-2
Tomahawk	12-23	5-15	1.45-1.65	2.0-6.0	0.10-0.14	4.5-5.5	<2	Low	0.15		
	23-80	2-8	1.60-1.75	6.0-20	0.04-0.08	4.5-6.5	<2	Low	0.10		

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cm	In/hr	In/in	pH	mmhos/cm				Pct
To----------	0-11	5-18	1.20-1.40	0.6-2.0	0.20-0.30	3.6-5.5	<2	Low----------	0.10	5	10-15
Torhunta	11-50	5-18	1.35-1.60	2.0-6.0	0.10-0.15	3.6-5.5	<2	Low----------	0.15		
	50-80	2-18	1.45-1.65	6.0-20	<0.05	3.6-6.5	<2	Low----------	0.10		
Ur.											
Urban land											
WaB----------	0-55	2-15	1.30-1.60	6.0-20	0.05-0.08	5.1-7.3	<2	Low----------	0.10	5	<1
Wando	55-99	1-10	1.30-1.60	6.0-20	0.03-0.07	4.5-7.3	<2	Low----------	0.10		
WdB:											
Wando----------	0-55	2-15	1.30-1.60	6.0-20	0.05-0.08	5.1-7.3	<2	Low----------	0.10	5	<1
	55-99	1-10	1.30-1.60	6.0-20	0.03-0.07	4.5-7.3	<2	Low----------	0.10		
Urban land.											
Wo----------	0-14	5-18	1.45-1.65	2.0-6.0	0.10-0.15	3.6-5.5	<2	Low----------	0.15	5	2-4
Woodington	14-55	5-18	1.45-1.65	2.0-6.0	0.10-0.15	3.6-5.5	<2	Low----------	0.20		
	55-80	3-18	1.45-1.65	2.0-20	0.06-0.15	3.6-5.5	<2	Low----------	0.10		
YaB----------	0-7	10-35	1.20-1.40	0.06-0.2	0.20-0.22	4.5-6.5	<2	Low----------	0.28	2	<1
Yaupon	7-76	35-60	1.30-1.50	<0.06	0.12-0.18	4.5-8.4	<2	High---------	0.32		

TABLE 18.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
BaB---------- Baymeade	A	None-------	---	---	4.0-5.0	Apparent	Dec-Apr	---	---	Low------	Moderate.
BDC:											
Baymeade------	A	None-------	---	---	4.0-5.0	Apparent	Dec-Apr	---	---	Low------	Moderate.
Marvyn--------	B	None-------	---	---	>6.0	---	---	---	---	Moderate	High.
BnB---------- Blanton	A	None-------	---	---	5.0-6.0	Perched	Dec-Mar	---	---	High-----	High.
BO*---------- Bohicket	D	Frequent---	Very brief.	Jan-Dec	+3-0	Apparent	Jan-Dec	3-6	6-12	High-----	High.
BrB---------- Bragg	C	None-------	---	---	>6.0	---	---	---	---	Moderate	High.
CA*---------- Carteret	D	Frequent---	Very brief.	Jan-Dec	+3-1.0	Apparent	Jan-Dec	---	---	High-----	High.
CH---------- Chowan	D	Frequent---	Very long.	Nov-Apr	0-0.5	Apparent	Nov-Apr	---	---	High-----	High.
Co---------- Corolla	D	Rare-------	---	---	1.5-3.0	Apparent	Nov-May	---	---	Low------	Low.
CT---------- Croatan	D	Rare-------	---	---	0-1.0	Apparent	Dec-May	4-10	18-24	High-----	High.
DO---------- Dorovan	D	Frequent---	Very long.	Jan-Dec	+1-0.5	Apparent	Jan-Dec	4-12	10-30	High-----	High.
Du---------- Duckston	D	Occasional	Brief	Jan-Dec	1.0-2.0	Apparent	Jan-Dec	---	---	Low------	Low.
Fo---------- Foreston	C	None-------	---	---	2.5-3.5	Apparent	Dec-Apr	---	---	Moderate	High.
GoA---------- Goldsboro	B	None-------	---	---	2.0-3.0	Apparent	Dec-Apr	---	---	Moderate	High.
Gt---------- Grifton	D	None-------	---	---	0.5-1.0	Apparent	Dec-May	---	---	High-----	Low.
Jo---------- Johns	C	None-------	---	---	1.5-3.0	Apparent	Dec-Apr	---	---	Moderate	High.
KrB---------- Kureb	A	None-------	---	---	>6.0	---	---	---	---	Low------	Low.
LA*---------- Lafitte	D	Frequent---	Brief	Jan-Dec	0-0.5	Apparent	Jan-Dec	15-30	>51	High-----	Moderate.
Lo---------- Leon	D	None-------	---	---	0-1.0	Apparent	Jun-Feb	---	---	High-----	High.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
Lu---------- Lumbee	D	Rare-------	---	---	0-1.5	Apparent	Nov-Apr	---	---	High-----	High.
Ly---------- Lynchburg	C	None-------	---	---	0.5-1.5	Apparent	Nov-Apr	---	---	High-----	High.
Ma---------- Mandarin	C	None-------	---	---	1.5-3.5	Apparent	Jun-Dec	---	---	Moderate	High.
Mk---------- Muckalee	D	Frequent---	Brief	Nov-Apr	0.5-1.5	Apparent	Dec-Mar	---	---	High-----	Moderate.
Mu---------- Murville	D	None-------	---	---	0-1.0	Apparent	Nov-May	---	---	High-----	Moderate.
NeE, NhE------- Newhan	A	None-------	---	---	>6.0	---	---	---	---	High-----	Low.
NoB---------- Norfolk	B	None-------	---	---	4.0-6.0	Apparent	Jan-Mar	---	---	Moderate	High.
On---------- Onslow	B	None-------	---	---	1.5-3.0	Apparent	Dec-Apr	---	---	High-----	High.
PaA---------- Pactolus	A	None-------	---	---	1.5-3.0	Apparent	Dec-Apr	---	---	Low------	High.
Pn---------- Pantego	D	None-------	---	---	0-1.5	Apparent	Dec-May	---	---	High-----	High.
Pt. Pits											
Ra---------- Rains	D	None-------	---	---	0-1.0	Apparent	Nov-Apr	---	---	High-----	High.
Tm---------- Tomahawk	A	None-------	---	---	1.5-3.0	Apparent	Dec-Apr	---	---	Moderate	High.
To---------- Torhunta	C	None-------	---	---	0.5-1.5	Apparent	Dec-May	---	---	High-----	High.
Ur. Urban land											
WaB---------- Wando	A	None-------	---	---	4.0-6.0	Apparent	Jan-Mar	---	---	Low------	Moderate.
WdB: Wando---------	A	None-------	---	---	4.0-6.0	Apparent	Jan-Mar	---	---	Low------	Moderate.
Urban land.											
Wo---------- Woodington	D	None-------	---	---	0.5-1.0	Apparent	Dec-May	---	---	High-----	High.
YaB---------- Yaupon	D	None-------	---	---	2.0-4.0	Apparent	Jan-Dec	---	---	High-----	Moderate.

*This map unit is subject to daily tides.

TABLE 19.--ENGINEERING TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon and depth in inches	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--					Max-dry density	Optimum Moisture
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm				
										Pct		Lb/FT3	Pct
Baymeade fine sand 1/													
S79NC019-002													
E -- 3- 9	A-2-4(0)	SM	100	100	95	14	6	2	1	---	NP	106.5	12.0
E/Bh -- 9-23	A-2-4(0)	SM	100	100	96	20	10	5	3	---	NP	114.7	9.4
Bt1 -- 23-42	A-2-4(0)	SM-SC	100	100	96	33	23	18	16	22	6	120.3	11.9
C -- 62-80	A-3(0)	SP-SM	100	100	86	10	6	5	3	---	NP	110.2	12.2
Goldsboro fine sandy loam 2/													
S77NC019-041													
Ap -- 0- 9	A-2-4(0)	SM	100	100	99	31	17	6	3	---	NP	114.2	11.2
Bt2 -- 20-32	A-6(3)	SC	100	100	100	48	38	26	23	30	14	116.2	13.9
Onslow fine sandy loam 3/													
S77NC019-32													
E1 -- 9-17	A-4(0)	SM	100	100	98	41	17	11	8	---	NP	117.2	11.1
E2 -- 17-22	A-4(1)	SM-SC	100	100	99	47	28	22	19	24	7	118.4	12.3
Btg2 -- 50-65	A-6(4)	CL	100	100	98	60	36	27	20	30	11	114.7	14.0
Wando fine sand 4/													
S77NC019-040													
A -- 0- 8	A-3(0)	SP	100	100	92	4	3	3	1	---	NP	104.6	13.8
C1 -- 8-35	A-3(0)	SP-SM	100	100	92	5	5	3	3	---	NP	105.4	13.4

1/ Typical pedon for series in this survey area.

2/ 1.5 miles east of Bolivia on SR 1513 and 50 feet south of SR 1513 in an open field.

3/ 1.5 miles northwest of Navassa on SR 1430; 0.3 mile east on SR 1431; 50 feet south of road in pine stand.

4/ Oak Island: 1320 feet north of the intersection of 61 Street East and Youpon Drive East and 20 feet east of 61 Street East in woods.

TABLE 20.--CLASSIFICATION OF THE SOILS

[An asterick (*) indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

Soil name	Family or higher taxonomic class
Baymeade	Loamy, siliceous, thermic Arenic Hapludults
*Blanton	Loamy, siliceous, thermic Grossarenic Paleudults
*Bohicket	Fine, mixed, nonacid, thermic Typic Sulfaquents
*Bragg	Fine-loamy, siliceous, acid, thermic Typic Udorthents
Carteret	Mixed, thermic Typic Psammaquents
Chowan	Fine-silty, mixed, nonacid thermic Thapto-Histic Fluvaquents
Corolla	Thermic, uncoated Aquic Quartzipsamments
Croatan	Loamy, siliceous, dysic, thermic Terric Medisaprists
Dorovan	Dysic, thermic Typic Medisaprists
Duckston	Siliceous, thermic Typic Psammaquents
Foreston	Coarse-loamy, siliceous, thermic Aquic Paleudults
Goldsboro	Fine-loamy, siliceous, thermic Aquic Paleudults
Grifton	Fine-loamy, siliceous, thermic Typic Ochraqualfs
Johns	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Aquic Hapludults
Kureb	Thermic, uncoated Spodic Quartzipsamments
Lafitte	Euic, thermic Typic Medisaprists
Leon	Sandy, siliceous, thermic Aeric Haplaquods
Lumbee	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Typic Ochraquults
Lynchburg	Fine-loamy, siliceous, thermic Aeric Paleaquults
Mandarin	Sandy, siliceous, thermic Typic Haplohumods
Marvyn	Fine-loamy, siliceous, thermic Typic Hapludults
Muckalee	Coarse-loamy, siliceous, nonacid, thermic Typic Fluvaquents
Murville	Sandy, siliceous, thermic Typic Haplaquods
Newhan	Thermic, uncoated Typic Quartzipsamments
Norfolk	Fine-loamy, siliceous, thermic Typic Paleudults
Onslow	Fine-loamy, siliceous, thermic Spodic Paleudults
Pactolus	Thermic, coated Aquic Quartzipsamments
Pantego	Fine-loamy, siliceous, thermic Umbric Paleaquults
Rains	Fine-loamy, siliceous, thermic Typic Paleaquults
*Tomahawk	Loamy, siliceous, thermic Arenic Hapludults
Torhunta	Coarse-loamy, siliceous, acid, thermic Typic Humaquepts
Wando	Mixed, thermic Typic Udipsamments
Woodington	Coarse-loamy, siliceous, thermic Typic Paleaquults
Yaupon	Clayey, mixed, nonacid, thermic Aquic Udorthents

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